

Midea Commercial Air Conditioner

R410A Full DC Inverter V4 Plus

K series Outdoor Unit

Technical Service Manual

(380V~3ph~50Hz)



CONFIDENTIAL

R-410A

HEAT PUMP TYPE DC INVERTER VRF

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Part 1 General Information

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1. MDV Product Development History

In 1999, Midea cooperated with Toshiba, produced the No.1 AC Inverter VRF MDV.

In 2001, Midea produced the No1. MDV in Air-conditioning industry.

In 2002, Midea developed the No.1 AC Inverter VRF MDV, and the No1. D series MDV in China.

In 2003, Midea completed the 2nd D series and 2nd V series MDV.

In 2005, Midea cooperated with Hitachi, produced the No.1 module's AC Inverter V3 and digital scroll D3.

In 2005, Midea cooperated with IR Company, founded united lab.

In 2008, Midea launched out the MDV4, which is the R410A DC Inverter VRF and Modular design also.

In 2010, the new MDV4+ was on sale, which owns the entirely DC Inverter technology and new low noise technology.

In 2012, the V4 Plus K series on sale, with the largest capacity up to 72HP.

2. DC Inverter V4+ K Series Introduction

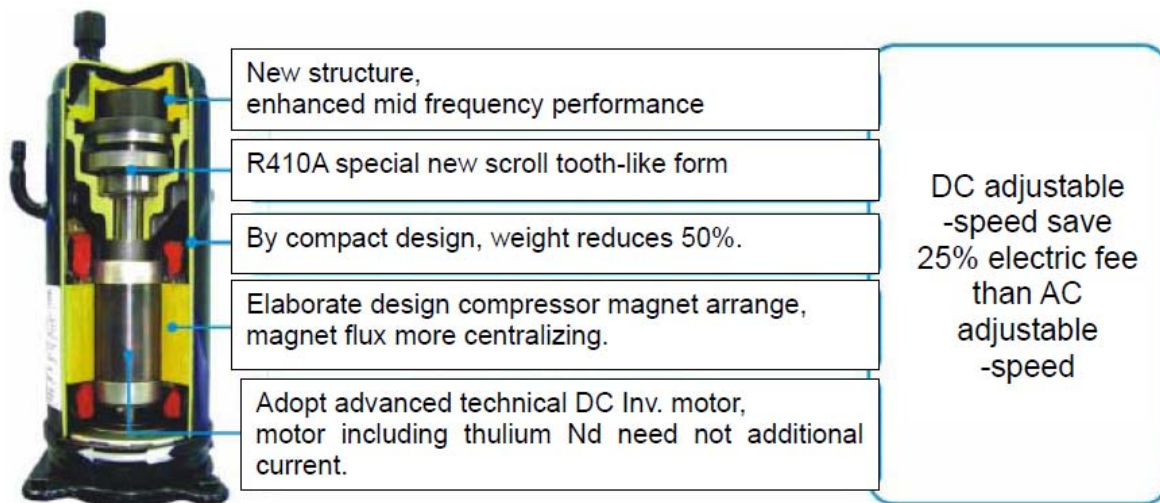
2.1 Free combination, The World's Largest Capacity 72HP

V4+ K series achieved world's largest capacity of 72HP by combining maximum 4 outdoor units with 6 different capacities. (8, 10, 12, 14, 16 and 18HP), and 64 indoor units can be connected max..

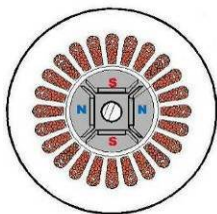
2.2 High efficiency and Energy-saving:

V4+ K Series realized the industry's top class energy efficiency with cooling and heating COP by adoption of Brushless Reluctance DC compressor control, DC Fan motor and improved heat exchanger performance with a new design.

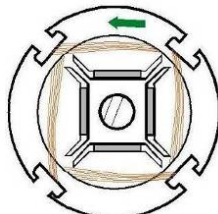
2.2.1 High efficiency DC inverter compressor, saving power 25%



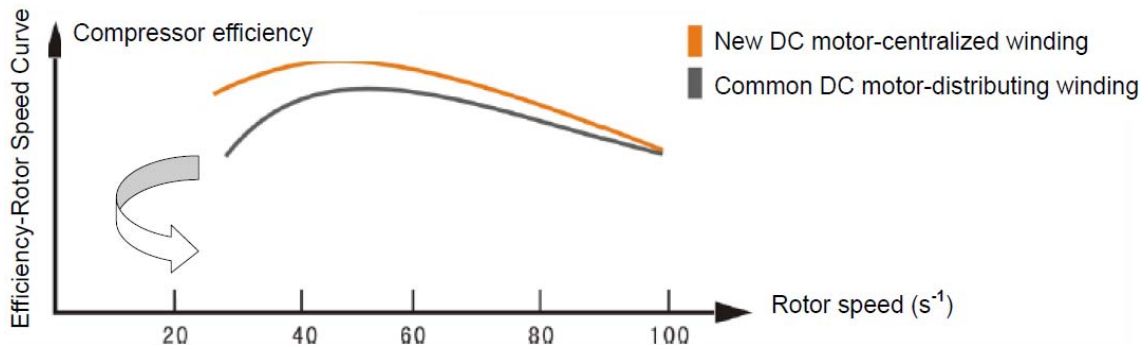
The A/C load ratio of building is 30%-75%, the area use ratio is 55%, most of the A/C runs in the mid load, so the mid load operation ratio control the whole year AC running charge.



Centralizing winding

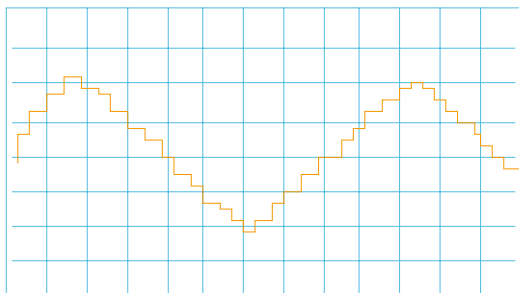


Distributing winding

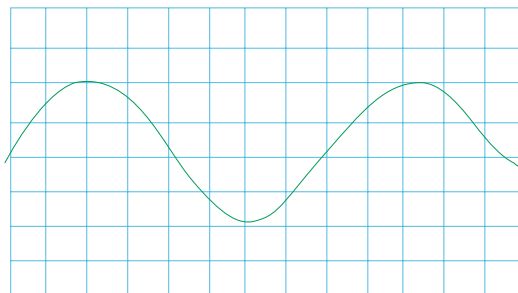


Smooth sine wave DC Inverter

Motor uses 180° sine wave vector drive technology to ensure transducer to output smooth curve, which show motor rotor speed to run smooth. While, common frequency motor outputs sawtooth wave not to precisely show motor speed, so its efficiency is low.



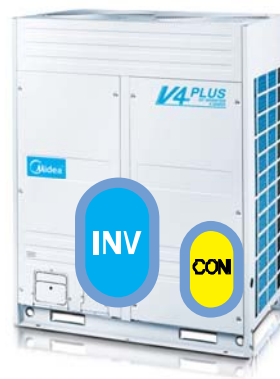
Common sawtooth wave



Sine Wave DC inverter



8HP&10HP units adopt only one DC Inverter Compressor, offer a high efficiency and energy saving solution.



12,14,16,18HP units adopt a high capacity DC inverter compressor and a fixed compressor combination

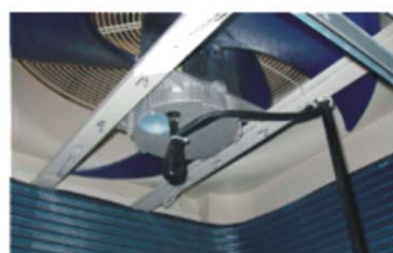
2.2.2 High efficiency DC Fan motor, saving power 50%

According to the running load and pressure, it controls the speed of DC fan to achieve the min. energy consume, to reach the best effect.

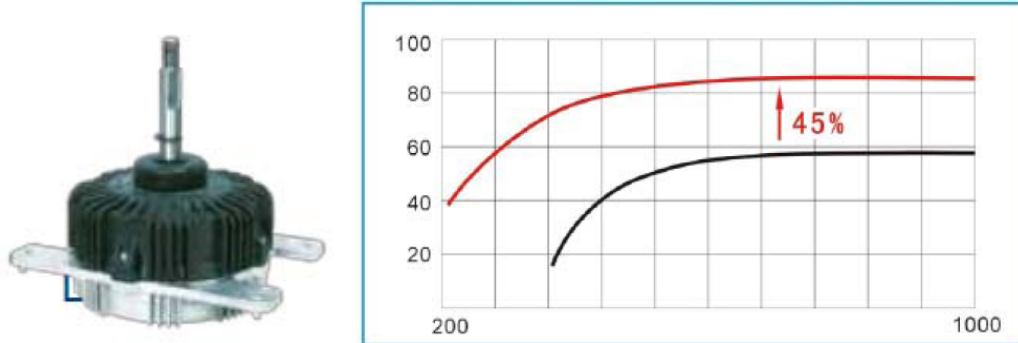
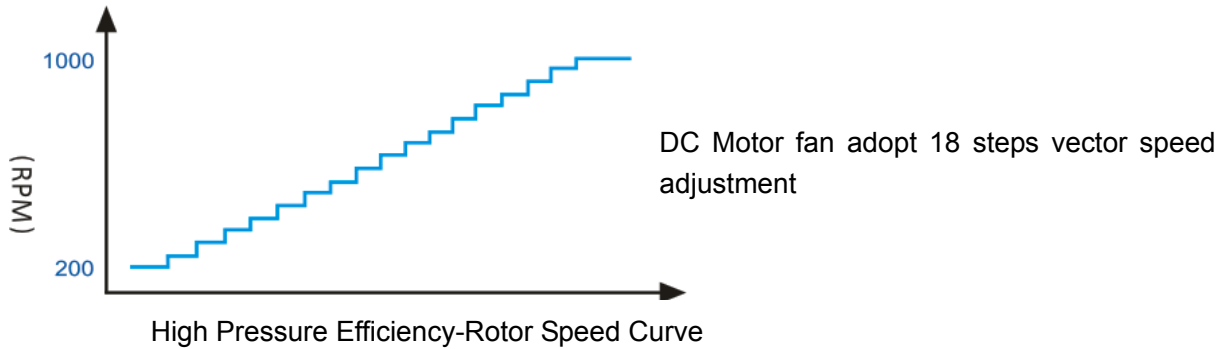
- Used across entire range of models (from 8 to 72 HP).
- Efficiency improvement by up to 45% especially at low speed.



Pressure sensor



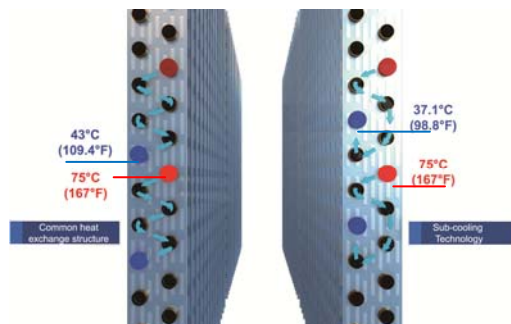
DC Fan motor



Motor rotor speed waves among ± 5 rpm, and can rapidly match DC Inverter Compressor to output, and enhance efficiency in part load.

2.2.3 Optimize heat exchange design, Heat exchange efficiency increase 10%

12°C Sub-cooling degree makes the cooling capacity increased efficiently. Innovative designed outdoor unit high efficiency heat exchanger, one time can reach up to 12°C sub-cooling degree, reduces the system resistance and improves reliability.

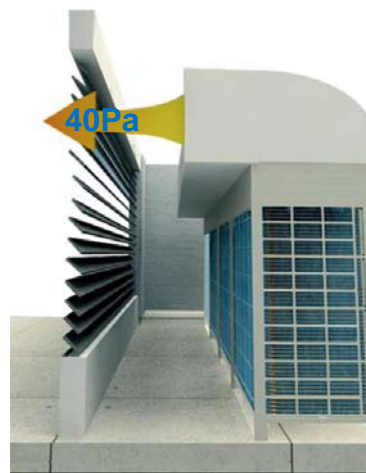


2.3 More flexible design

2.3.1 External static pressure enhanced up to 40 Pa and air volume increase 10%.

Applied high static pressure propeller fan and the optimum fan guard for high external static pressure, to respond to a range of various installation environments. Midea now offers up to 40Pa (4.08 mm H₂O) external static pressure specification as an option (0~20Pa as standard). to meet the requirements of veranda installation.

* Customization is required.



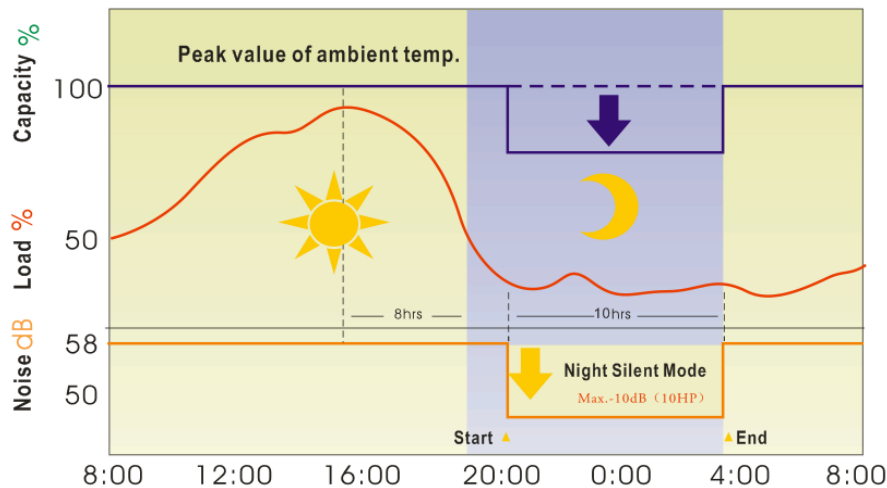
2.3.2 More options of Indoor units and high capacity connection

Lineup of heat pump types is 8 to 72 HP. Indoor units consist of 14 types with a total of 102 models (not including Outdoor Air Processing Units), capacity ranges from 1.8kW to 28kW. A maximum 130% indoor unit's connective ratio is allowed for all outdoor unit capacities. This wide selection of models makes it possible to build a system that suits the customer's requirements.

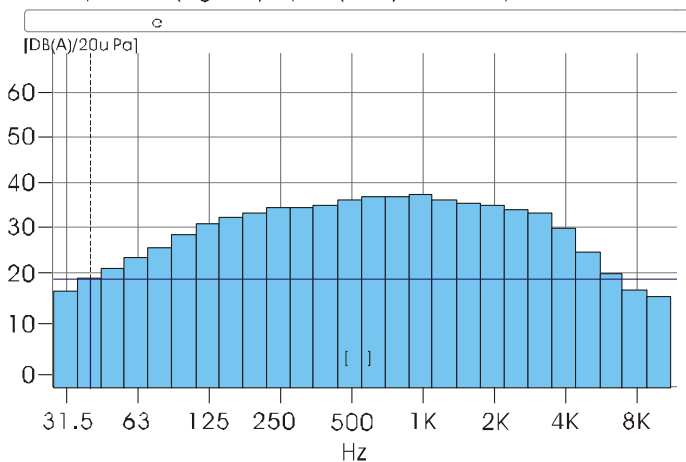
2.4 High Comfort

2.4.1 Optional outdoor units Silent Mode control

Night silent operation will be activated X (6, 8) hours after the peak temperature during daytime, and it will get back to normal operation after Y (8,10,12) hours. To run in lower speed, lower noise, min. **46.8dB (A)**



Autosp ctrum(Signal2)-Input2(Real)\CPB Analyzer



Cursor values

X: 40.000Hz

Y: 18.544dB(A)/200

Total: **46.803dB(A)**

2.4.2 More Options for outdoor units

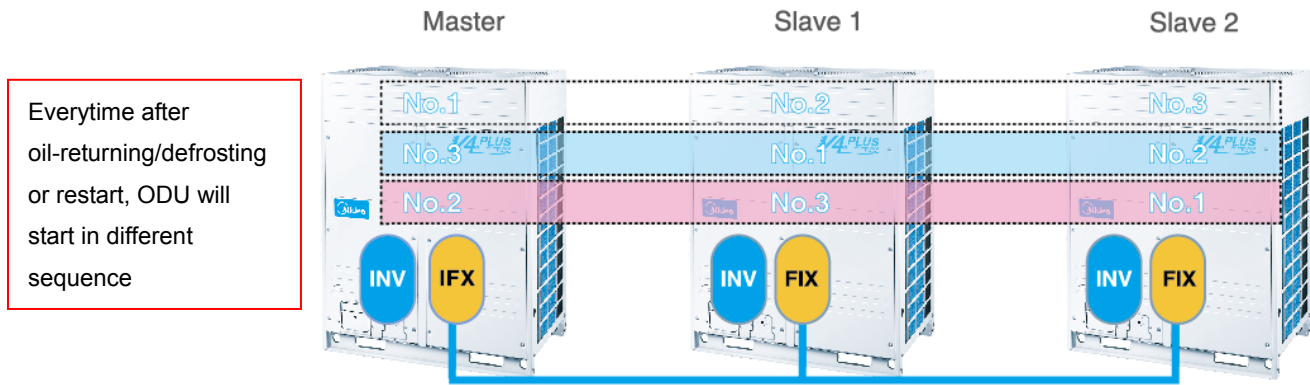
Night silent mode, silence mode, super silence mode.

2.5 High Reliability

2.5.1 Alternative Cycle Duty operation of outdoor units

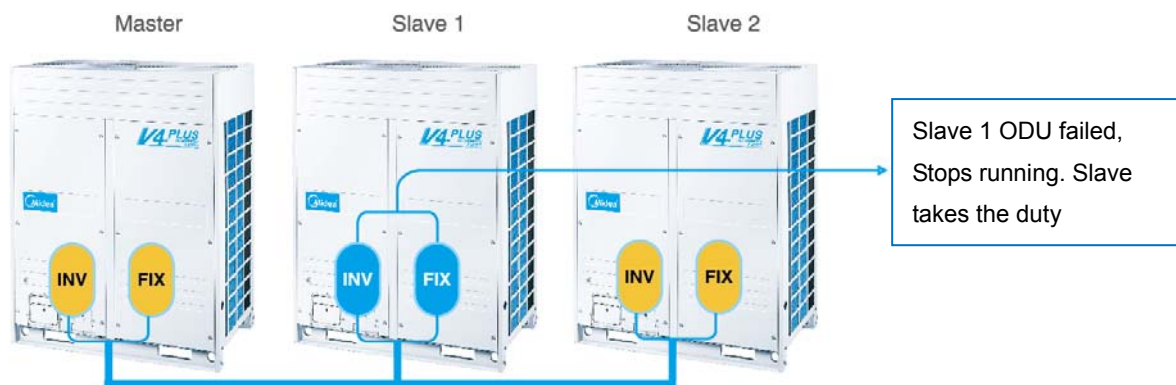
V4+ K Series intelligent control, according to the system load, cyclically changes start-up sequence of multiple outdoor units, equalizes compressor duty and extends operation life-span.

Take 48HP system for example.



2.5.2 Back-Up operation function

In the event of an outdoor unit fail, the field set back-up function in the outdoor unit in question (also between different outdoor units) will allow emergency operation of another outdoor unit, in order to maintain the interim capacity.



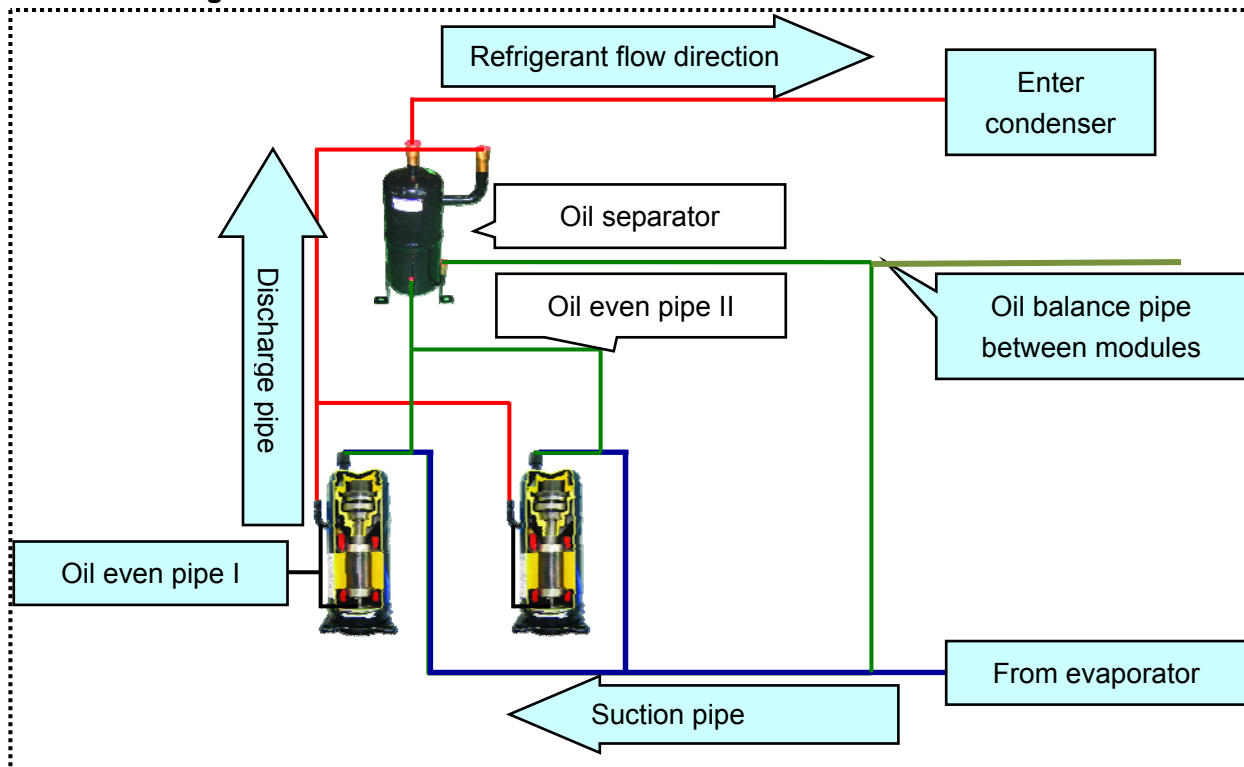
2.5.3 Dynamic gas balance technology

Dynamic vector balance tech., no need to install gas balance pipe:

- High-precision pressure sensor monitors the system pressure on time and transfers the data to master unit
- Master unit sends the pressure data to every unit and make sure each outdoor unit in balance situation.

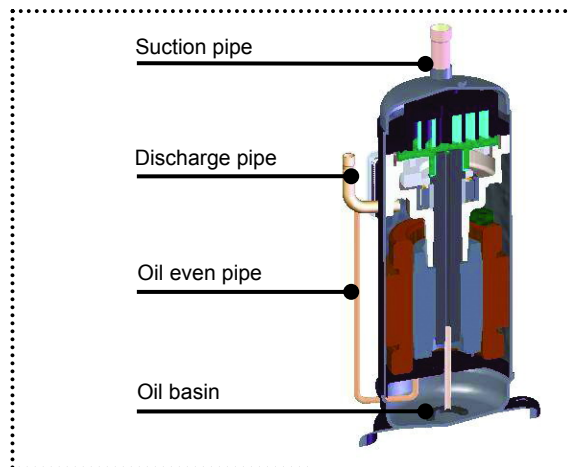
2.5.4 High efficiency oil balance technology

2.10.1 Oil balance pipes set among the modules, and individual oil balance vector control ensures oil distribution among the modules to compressor smooth and reliable running. When one compressor's oil is overfull, oil balance pipes and outlet pipes both send the oil to system, and then system in average distributes the oil to the other compressors.

Oil balance diagram:

Adopts high efficient centrifugal-type oil separator, which separate the oil from discharged refrigerant with up to 99% effect to make all the lubricant discharged from compressor can be returned in time.

- New designed low pressure liquid receiver with high efficiency of oil-return effect.
- Oil balance ensures sufficient refrigerant lubricant supply. Elaborately designed oil-return hole, which ensure reliable oil-return for every compressor.

**2.5.5 Oil return technology**

Centrifugal oil separator can be up to over 99% separating efficiency, which in time and efficiently send the oil to compressors to ensure compressor oil volume.

System auto back oil design can complete through PC core send oil back instruction by system running time and state.

The accumulator is large volume design, which can more save refrigerant to avoid liquid strike.

Multi back oil holes can ensure compressor smooth back oil.

2.5.6 Intelligent soft start technology, rapidly enhance refrigerant cycle volume

Compressor soft start complete low frequency and low current start by DC Inv. compressor, and to reduce strike to electric network. When start DC Inv. Compressor, system runs in large volume and offer more heating capacity. And use the start rapidly advantage of fixed frequency compressor to quickly up to output aim.

- Compressor soft start
- Lubrication system soft start

2.6 Convenient for installation and service

2.6.1 Auto addressing

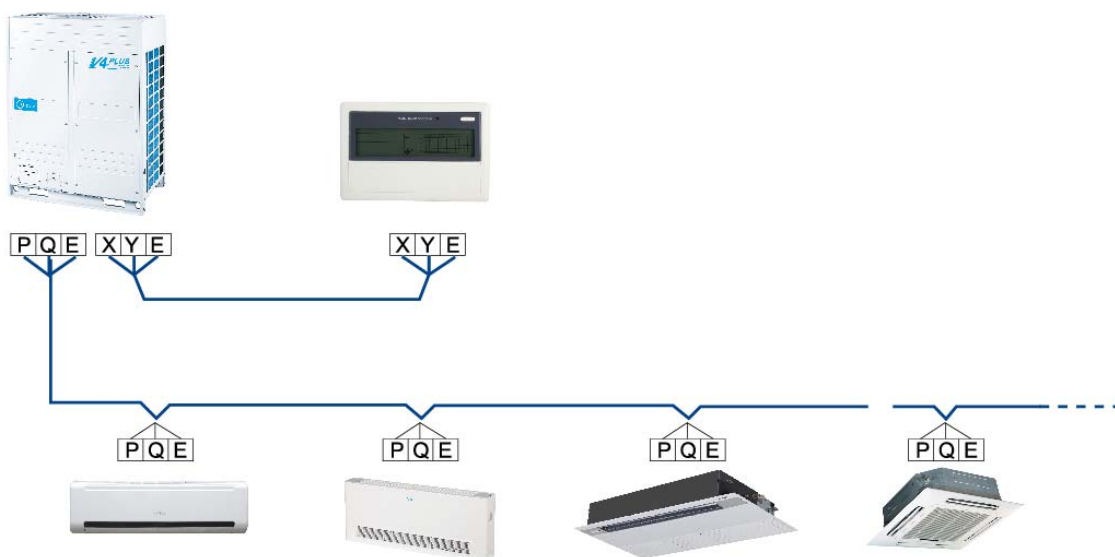
Addressing outdoor units and indoor units are automatically done just by pressing the button of the controller.

- The outdoor unit can automatically distribute the address to indoor units without any manual settings.
- Wireless controller can enquiry and modify every indoor units address.
- Up to 64 indoor units can be connected to one system and identified automatically

2.6.2 Super Wiring

It is possible to enable the shared use of the wiring between indoor & outdoor units, as well the centralized control. Hence make it easy for the user to retrofit the existing system with a centralized control, by simply connecting it to the outdoor units.

- PQE & XYE, just only one group of communication wire of PQE, achieved both of communication for indoor & outdoor unit and network.
- reversible communication , central controller can connect from indoor side or outdoor side at will



2.6.3 Convenient for maintenance



Convenient electronic control check window. Can directly observe the operation status from the LED display, and directly press the FORCE COOLING / CHECK button.



The high/low pressure valves adopt the Stop Valves, which has screwed thread nipple joint, can be connected the Meter connector directly for more convenience in air tight test. And also make more efficient and easy for installation.



Self diagnosis function and four-digit Digital display, help service engineer to find out the fault fast and easily.

3. Model Line Up

Outdoor units (Combination Unit):

8, 10 HP	12 ,14 ,16 HP	18HP
		
18, 20, 22, 24, 26, 28, 30, 32 HP	34, 36, 38, 40, 42, 44, 46, 48 HP	
		
50, 52, 54, 56, 58, 60, 62, 64 HP		
		
66, 68, 70, 72 HP		
		

*18HP model will be available at the end for 2012. The above recommended combination pattern will be changed at that time.

4. Units Combination Table

Capacity (HP)	Model	Recommend combination						Max. indoor units nos.
		8(HP)	10(HP)	12(HP)	14(HP)	16(HP)	18(HP)	
8	MDV-252(8)W/DRN1(C)	●						13
10	MDV-280(10)W/DRN1(C)		●					16
12	MDV-335(12)W/DRN1(C)			●				20
14	MDV-400(14)W/DRN1(C)				●			23
16	MDV-450(16)W/DRN1(C)					●		26
18	MDV-532(18)W/DRN1(C)	●	●					29
20	MDV-560(20)W/DRN1(C)		●●					33
22	MDV-615(22)W/DRN1(C)		●	●				36
24	MDV-680(24)W/DRN1(C)		●		●			39
26	MDV-730(26)W/DRN1(C)		●			●		43
28	MDV-785(28)W/DRN1(C)				●●			46
30	MDV-850(30)W/DRN1(C)				●	●		50
32	MDV-900(32)W/DRN1(C)					●●		53
34	MDV-960(34)W/DRN1(C)		●●		●			56
36	MDV-1010(36)W/DRN1(C)		●●			●		59
38	MDV-1065(38)W/DRN1(C)		●	●		●		63
40	MDV-1130(40)W/DRN1(C)		●		●	●		64
42	MDV-1180(42)W/DRN1(C)				●●●			64
44	MDV-1235(44)W/DRN1(C)				●●	●		64
46	MDV-1300(46)W/DRN1(C)				●	●●		64
48	MDV-1350(48)W/DRN1(C)					●●●		64
50	MDV-1432(50)W/DRN1(C)	●	●			●●		64
52	MDV-1460(52)W/DRN1(C)		●●			●●		64
54	MDV-1515(54)W/DRN1(C)		●	●		●●		64
56	MDV-1580(56)W/DRN1(C)		●		●	●●		64
58	MDV-1630(58)W/DRN1(C)				●●●	●		64
60	MDV-1685(60)W/DRN1(C)				●●	●●		64
62	MDV-1750(62)W/DRN1(C)				●	●●●		64
64	MDV-1800(64)W/DRN1(C)					●●●●		64
66	MDV-1931(66)W/DRN1(C)			●			●●●	64
68	MDV-1996(68)W/DRN1(C)				●		●●●	64
70	MDV-2046(70)W/DRN1(C)					●	●●●	64
72	MDV-2128(72)W/DRN1(C)						●●●●	64

*18HP model will be available at the end for 2012. The above recommended combination pattern will be changed at that time.

5. Capacity Range of Indoor Units

Power supply of all the indoor units is 1 phase, 220-240V

Capacity (kW)	2.2	2.8	3.6	4.5	5.6	7.1	8	9	10	11.2	12.5	14	16	20	25	28	40	45	56
BTU/H	7500	9600	12300	15400	19100	24200	27300	30700	34100	38200	42600	47800	54600	68200	85300	95500	136500	153500	191100
Ton	0.6	0.8	1	1.3	1.6	2	2.3	2.6	2.9	3.2	3.5	4	5	5.7	7.1	8	11	12.3	15.4
HP	0.8	1	1.25	1.6	2	2.5	2.8	3.2	3.6	4	4.4	5	6	8	9	10	14	15.7	19.6
INDEX	22	28	36	45	56	71	80	90	100	112	123	140	160	200	250	280	400	450	560
One-way Cassette		√	√	√	√	√													
Two- way Cassette	√	√	√	√	√	√													
Compact Four- way Cassette	√	√	√	√															
Four-way Cassette Type	√	√	√	√	√	√	√	√	√	√		√							
Low Static Pressure Duct	√	√	√	√	√														
Ductable Unit A5 Type	√	√	√	√	√	√	√	√		√		√							
High Static Pressure Duct						√	√	√		√		√	√	√	√	√	√	√	√
Ceiling & Floor			√	√	√	√	√	√		√		√	√						
Wall-mounted -S Type	√	√	√	√	√														
Wall-mounted -C Type	√	√	√	√	√														
Wall-mounted -R Type						√	√	√											
Console	√	√	√	√															
Concealed Floor-standin g	√	√	√	√	√	√	√												
Exposed Floor-standin g	√	√	√	√	√	√	√												
Exposed Floor-standin g(New panel)	√	√	√	√	√	√	√												
Fresh Air processing Unit											√	√		√	√	√			

6. External Appearance and model names of Indoor Units

External Appearance	Model Name	External Appearance	Model Name
 One-way cassette	MDV-D28Q1/N1-C MDV-D36Q1/N1-C MDV-D45Q1/N1-C MDV-D56Q1/N1-C MDV-D71Q1/N1-C	 Two-way cassette	MDV-D22Q2/N1 MDV-D28Q2/N1 MDV-D36Q2/N1 MDV-D45Q2/N1 MDV-D56Q2/N1
 Compact four-way cassette	MDV-D22Q4/N1-A3 MDV-D28Q4/N1-A3 MDV-D36Q4/N1-A3 MDV-D45Q4/N1-A3	 Four-way Cassette Type	MDV-D28Q4/N1-D MDV-D36Q4/N1-D MDV-D45Q4/N1-D MDV-D56Q4/N1-D MDV-D71Q4/N1-D MDV-D80Q4/N1-D MDV-D90Q4/N1-D MDV-D100Q4/N1-D MDV-D112Q4/N1-D MDV-D140Q4/N1-D
 Low Static Pressure Duct	MDV-D18T3/N1-B MDV-D22T3/N1-B MDV-D28T3/N1-B MDV-D36T3/N1-B MDV-D45T3/N1-B MDV-D56T3/N1-B	 Concealed Duct Unit (A5 Type)	MDV-D22T2/N1X-BA5 MDV-D28T2/N1X-BA5 MDV-D36T2/N1X-BA5 MDV-D45T2/N1X-BA5 MDV-D56T2/N1X-BA5 MDV-D71T2/N1X-BA5 MDV-D80T2/N1X-BA5 MDV-D90T2/N1X-BA5 MDV-D112T2/N1X-BA5 MDV-D140T2/N1X-BA5
 71~112 Model  140~160 Model High Static Pressure Duct	MDV-D71T1/N1-B MDV-D80T1/N1-B MDV-D90T1/N1-B MDV-D112T1/N1-B MDV-D140T1/N1-B MDV-D160T1/N1-B	 High Static Pressure Duct	MDV-D200T1/N1-B MDV-D250T1/N1-B MDV-D280T1/N1-B
 High Static Pressure Duct	MDV-D400T1/N1-B MDV-D450T1/N1-B MDV-D560T1/N1-B	 Ceiling & Floor	MDV-D36DL/N1-C MDV-D45DL/N1-C MDV-D56DL/N1-C MDV-D71DL/N1-C MDV-D80DL/N1-C MDV-D90DL/N1-C MDV-D112DL/N1-C MDV-D140DL/N1-C MDV-D160DL/N1-C

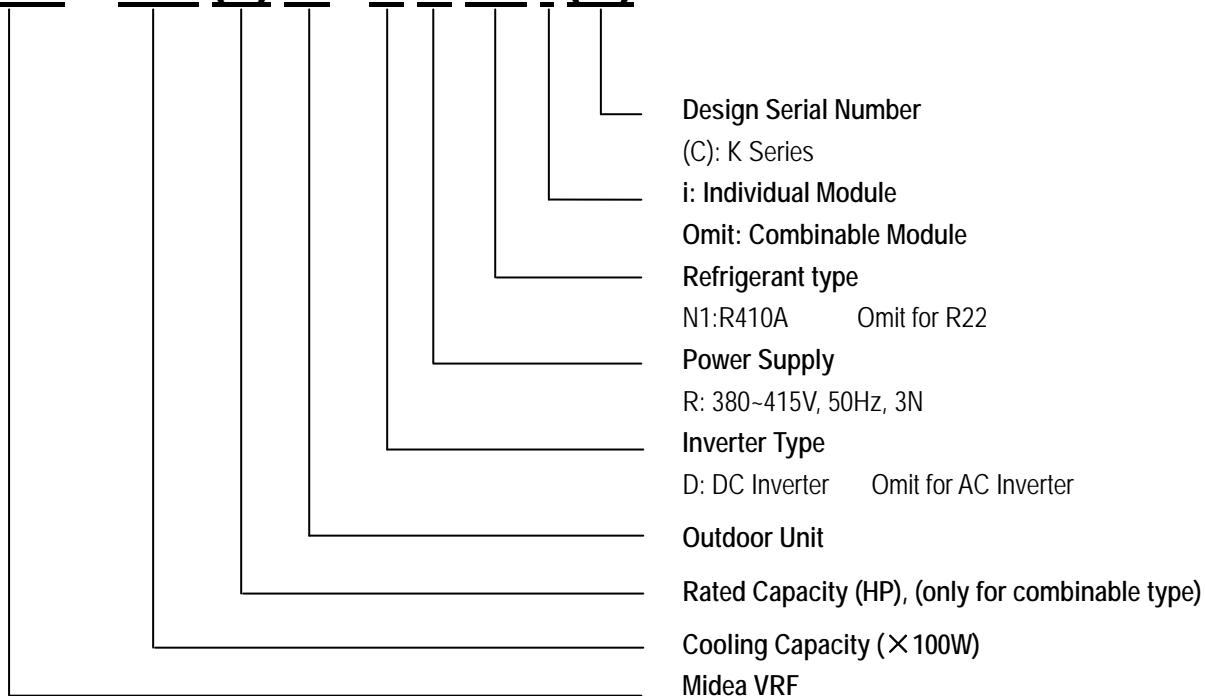
 <p>Wall-mounted -S Type</p>	MDV-D22G/N1-S MDV-D22G/DN1-S MDV-D28G/N1-S MDV-D28G/DN1-S MDV-D36G/N1-S MDV-D36G/DN1-S MDV-D45G/N1-S MDV-D45G/DN1-S MDV-D56G/N1-S MDV-D56G/DN1-S	 <p>Wall-mounted -C Type</p>	MDV-D22G/N1-S MDV-D22G/DN1-S MDV-D28G/N1-S MDV-D28G/DN1-S MDV-D36G/N1-S MDV-D36G/DN1-S MDV-D45G/N1-S MDV-D45G/DN1-S MDV-D56G/N1-S MDV-D56G/DN1-S
 <p>Wall-mounted R type</p>	MDV-D71G-R3/N1Y MDV-D80G-R3/N1Y MDV-D90G-R3/N1Y	 <p>Concealed floor standing</p>	MDV-D22Z/N1-F3B MDV-D28Z/N1-F3B MDV-D36Z/N1-F3B MDV-D45Z/N1-F3B MDV-D56Z/N1-F3B MDV-D71Z/N1-F3B MDV-D80Z/N1-F3B
 <p>Exposed floor standing Type (New Panel)</p>	MDV-D22Z/N1-F4(F5) MDV-D28Z/N1-F4(F5) MDV-D36Z/N1-F4(F5) MDV-D45Z/N1-F4(F5) MDV-D56Z/N1-F4(F5) MDV-D71Z/N1-F4(F5) MDV-D80Z/N1-F4(F5)	 <p>Console</p>	MDV-D22Z/DN1-B MDV-D28Z/DN1-B MDV-D36Z/DN1-B MDV-D45Z/DN1-B
 <p>Outdoor fresh air-processing unit</p>	MDV-D125T1/N1-FA MDV-D140T1/N1-FA	 <p>Outdoor fresh air-processing unit</p>	MDV-D200T1/N1-FA MDV-D250T1/N1-FA MDV-D280T1/N1-FA

The specifications, designs, and information in this book are subject to change without notice for product improvement.

7. Nomenclature

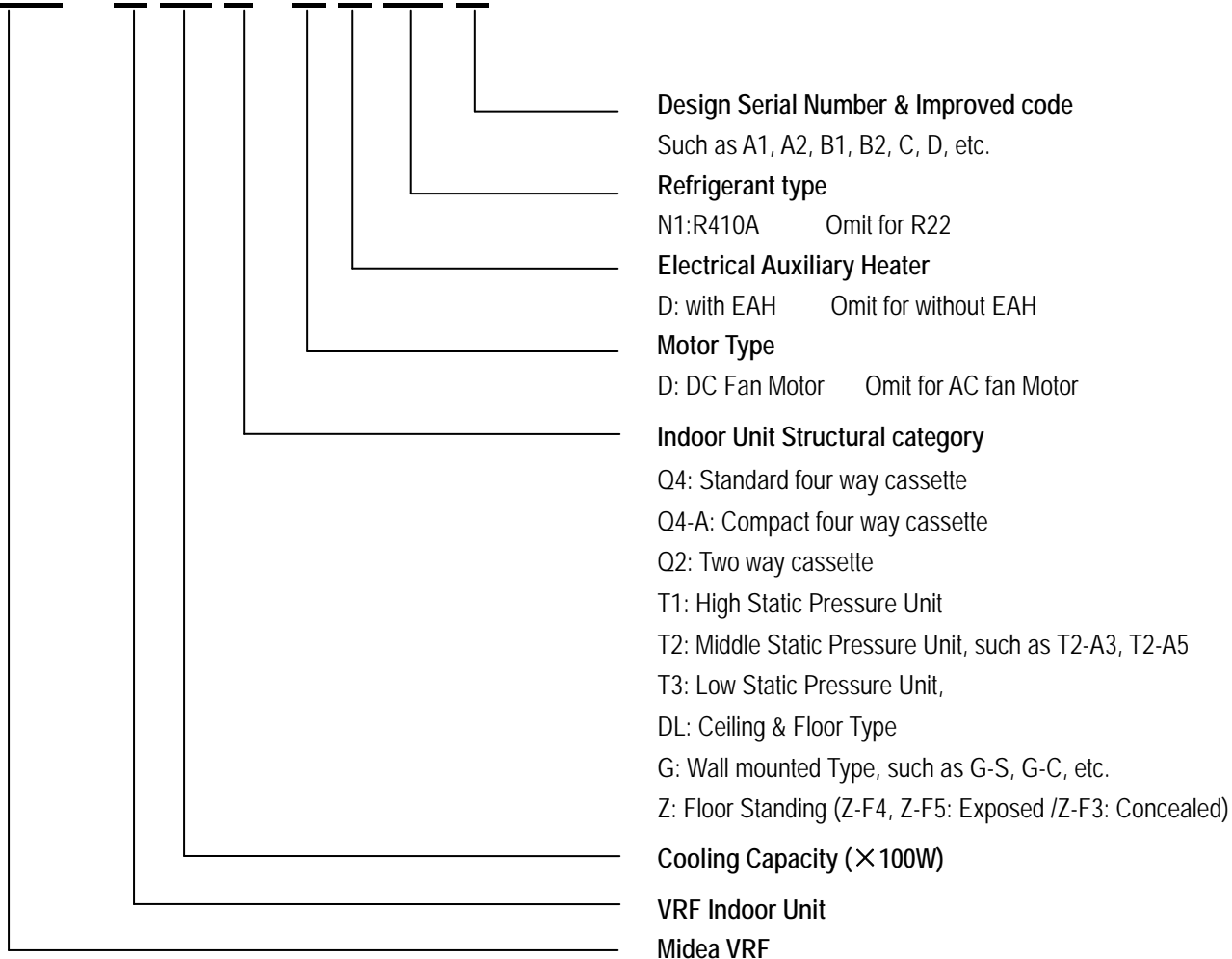
7.1 Outdoor unit:

MDV – 252 (8) W / D R N1 i (C)



7.2 Indoor unit:

MDV – D 28 Z / D D N1 A



Part 2 Selection Procedure

1 Introduction.....	2
2 Unit selection (Based on cooling load)	6

1. Introduction

1.1 Model Selection Procedure

Select the model and calculate the capacity for each refrigerant system according to the procedure shown below.

- Calculation of the indoor air-conditioning load, Calculate the maximum air-conditioning load for each room or zone.

Selection of an air conditioning system

- Select the ideal air conditioning system for air conditioning of each room or zone

Design of the control system

- Design a suitable control system for the selected air conditioning system

Preliminary selection of indoor and outdoor units

- Make preliminary selections that are within the allowable range for the system

Check of the tubing length and elevation difference

- Check that the length of refrigerant tubing and the elevation difference are within the allowable ranges

Calculation of the corrected outdoor unit capacity

- Capacity correction coefficient for model, outdoor temperature conditions, tubing length and elevation difference.

Calculation of the actual capacity for each indoor unit

- Calculate the corrected indoor/outdoor capacity ratio, based on the corrected outdoor unit capacity and the total corrected capacity of all indoor units in the same system.

Recheck of the actual capacity for each indoor unit

- If the capacity is inadequate, reexamine the unit combinations.

1.2 Indoor Unit Selection

Enter INDOOR UNIT CAPACITY TABLES at given indoor and outdoor temperature. Select the unit that the capacity is the nearest to and greater than given load.

Note:

Individual indoor unit capacity is subject to change by the combination. Actual capacity has to be calculated according to the combination by using outdoor unit capacity table.

1.2.1 Calculation of Actual Capacity of Indoor Unit

Because the capacity of a multi air-conditioner changes according to the temperature conditions, tubing length, elevation difference and other factors, select the correct model after taking into account the various correction values. When selecting The model, calculate the corrected capacities of the outdoor unit and each indoor unit. Use the corrected outdoor unit capacity and the total corrected capacity of all the indoor units to calculate the actual final capacity of each indoor unit.

Find the indoor unit capacity correction coefficient for the following items

- Capacity correction for the indoor unit temperature conditions

From the graph of capacity characteristics, use the indoor temperature to find the capacity correction coefficient.

- Capacity distribution ratio based on the indoor unit tubing length and elevation difference.

First, in the same way as for the outdoor unit, use the tubing length and elevation difference for each indoor unit to find the correction coefficient from the graph of capacity change characteristics

Capacity distribution ratio for each indoor unit = Correction coefficient for that indoor unit / Correction coefficient for the outdoor unit

1.3 Outdoor Unit Selection

Allowable combinations are indicated in INDOOR UNIT COMBINATION TOTAL CAPACITY INDEX TABLE.

In general, outdoor unit can be selected as follows though the location of the unit, zoning and usage of the rooms may be considered.

The indoor and outdoor unit combination is determined that the sum of indoor unit capacity index is

nearest to and smaller than the capacity index at 100% combination ratio of each outdoor unit. Up to 8~16 indoor units can be connected to one outdoor unit. It is recommended to choose a larger outdoor unit if the installation space is large enough.

If the combination ratio is greater than 100%, the indoor unit selection shall be reviewed by using actual capacity of each indoor unit.

INDOOR UNIT COMBINATION TOTAL CAPACITY INDEX TABLE

Outdoor Unit	Indoor Unit Combination Ratio (kW)								
	130%	120%	110%	100%	90%	80%	70%	60%	50%
8HP	32.8	30.2	27.7	25.2	22.7	20.1	17.6	15.1	12.6
10HP	36.4	33.6	30.8	28.0	25.2	22.4	19.6	16.8	14.0
12HP	43.6	40.2	36.9	33.5	30.2	26.8	23.5	20.2	16.8
14HP	52.0	48.0	44.0	40.0	36.0	32.0	28.0	24.0	20.0
16HP	58.5	54.0	49.5	45.0	40.5	36.0	31.5	27.0	22.5
18HP	69.2	63.8	58.5	53.2	47.9	42.6	37.2	31.9	26.6
20HP	72.8	67.2	61.6	56.0	50.4	44.8	39.2	33.6	28.0
22HP	80.0	73.8	67.7	61.5	55.4	49.2	43.1	36.9	30.8
24HP	88.4	81.6	74.8	68.0	61.2	54.4	47.6	40.8	34.0
26HP	94.9	87.6	80.3	73.0	65.7	58.4	51.1	43.8	36.5
28HP	102.1	94.2	86.4	78.5	70.7	62.8	55.0	47.1	39.3
30HP	110.5	102.0	93.5	85.0	76.5	68.0	59.5	51.0	42.5
32HP	117.0	108.0	99.0	90.0	81.0	72.0	63.0	54.0	45.0
34HP	124.8	115.2	105.6	96.0	86.4	76.8	67.2	57.6	48.0
36HP	131.3	121.2	111.1	101.0	90.9	80.8	70.7	60.6	50.5
38HP	138.5	127.8	117.2	106.5	95.9	85.2	74.6	63.9	53.3
40HP	146.9	135.6	124.3	113.0	101.7	90.4	79.1	67.8	56.5
42HP	153.4	141.6	129.8	118.0	106.2	94.4	82.6	70.8	59.0
44HP	160.6	148.2	135.9	123.5	111.2	98.8	86.5	74.1	61.8
46HP	169.0	156.0	143.0	130.0	117.0	104.0	91.0	78.0	65.0
48HP	175.5	162.0	148.5	135.0	121.5	108.0	94.5	81.0	67.5
50HP	186.2	171.8	157.5	143.2	128.9	114.6	100.2	85.9	71.6
52HP	189.8	175.2	160.6	146.0	131.4	116.8	102.2	87.6	73.0
54HP	197.0	181.8	166.7	151.5	136.4	121.2	106.1	90.9	75.8
56HP	205.4	189.6	173.8	158.0	142.2	126.4	110.6	94.8	79.0
58HP	211.9	195.6	179.3	163.0	146.7	130.4	114.1	97.8	81.5
60HP	219.1	202.2	185.4	168.5	151.7	134.8	118.0	101.1	84.3
62HP	227.5	210.0	192.5	175.0	157.5	140.0	122.5	105.0	87.5
64HP	234.0	216.0	198.0	180.0	162.0	144.0	126.0	108.0	90.0
66HP	251.0	231.7	212.4	193.1	173.8	154.5	135.1	115.9	96.6
68HP	259.5	239.5	219.6	199.6	179.6	159.7	139.7	119.8	99.8
70HP	266.0	245.5	225.1	204.6	184.1	163.7	143.2	122.8	102.3
72HP	276.6	255.4	234.1	212.8	191.5	170.2	148.9	127.7	106.4

INDOOR UNIT CAPACITY INDEX

Unit Size	Model 18	Model 22	Model 28	Model 36	Model 45	Model 56	Model 71	Model 80	Model 90	Model 112
Capacity Index (kW)	1.8	2.2	2.8	3.6	4.5	5.6	7.1	8.0	9.0	11.2
Unit Size	Model 140	Model 160	Model 200	Model 250	Model 280					
Capacity Index (kW)	14.0	16	20	25	28					

1.3 Actual Performance Date

Use OUTDOOR UNIT CAPACITY TABLES.

Determine correct table according to the outdoor unit model and combination ratio.

Enter the table at given indoor and outdoor temperature and find the outdoor unit capacity and power input. The individual indoor unit capacity (power input) can be calculated as follows.

$$IUC = OUC \times INX / TNX$$

Where,

IUC: Each indoor unit capacity

OUC: Outdoors unit capacity

INX: Each indoor unit capacity index

TNX: Total capacity index

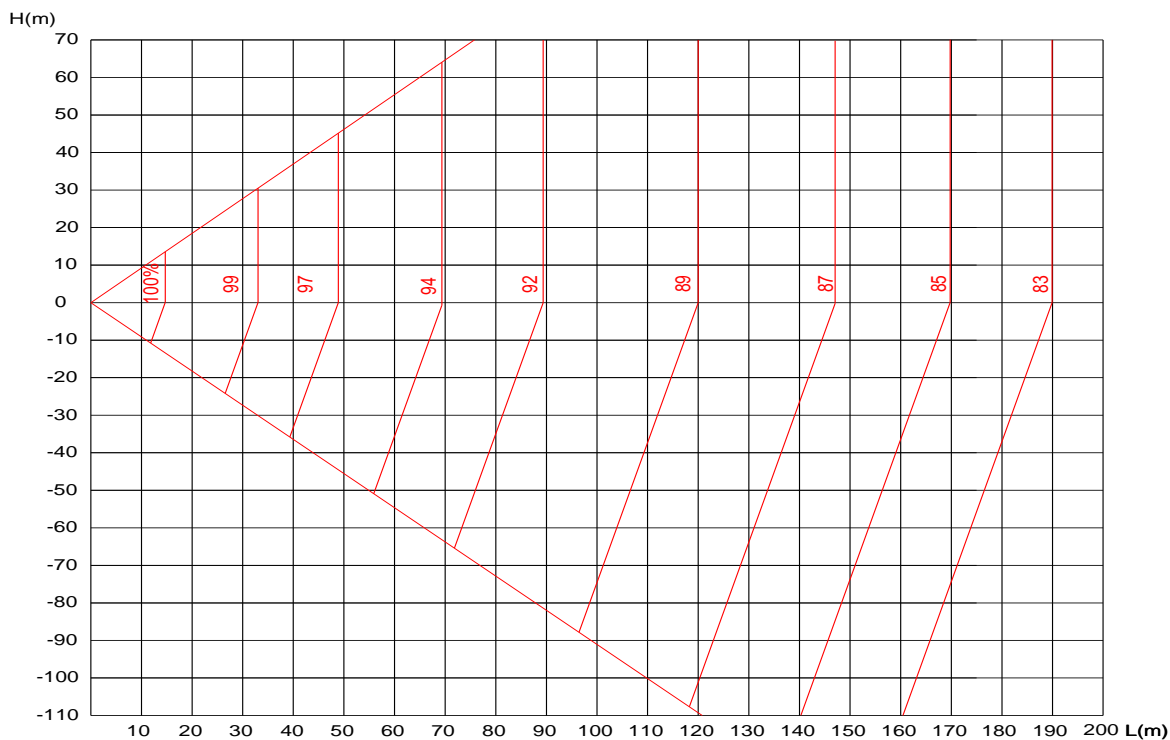
Then, correct the indoor unit capacity according to the piping length.

If the corrected capacity is smaller than the load, the size of indoor unit has to be increased and repeat the same selection procedure.

1.4 Variation in capacity in accordance with the length of refrigerant pipe

1.4.1 Cooling capacity modification

Modification coefficient of the length and high difference of refrigerant pipe:

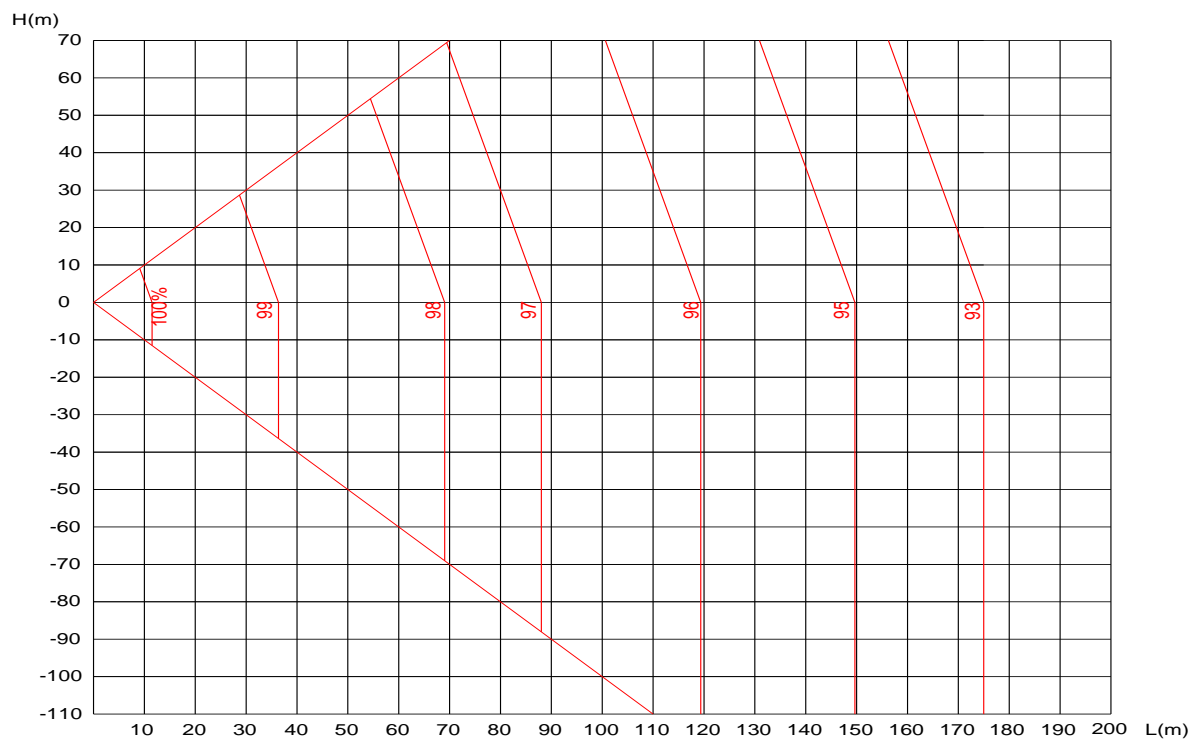


L: Refrigerant pipe equivalent length

H: Height difference between outdoor and indoor unit. Positive data means outdoor unit is top. Negative data means outdoor unit is down.

1.4.2 Heating capacity modification

Modification coefficient of the length and high difference of refrigerant pipe:



L: Refrigerant pipe equivalent length

H: Height difference between outdoor and indoor unit. Positive data means outdoor unit is top. Negative data means outdoor unit is down.

2 Unit Selection (Based on cooling load)

2.1 Given condition

2.1.1 Design condition (Cooling: Indoor 20°C (WB), Outdoor 35°C (DB))

2.1.2 Cooling load

Location	Room A	Room B	Room C	Room D	Room E	Room F
Load (kW)	2.1	2.8	3.5	4.6	5.8	7.2

2.1.3 Power supply unit: Outdoor 380~415V-3Ph-50Hz, Indoor 220~240V-1Ph-50Hz.

2.1.4 Pipe length: 50m

2.1.5 Height difference: 30m

2.2 Indoor unit selection

Select the suitable capacity for condition of 'Indoor 20°C (WB), Outdoor 35°C (DB)' using indoor unit capacity table. The selected result is as follows. (Assuming the indoor unit type is duct)

Location	Room A	Room B	Room C	Room D	Room E	Room F
Load (kW)	2.1	2.8	3.5	4.6	5.8	7.2
Unit size	22	28	36	45	56	71
Capacity (kW)	2.3	2.9	3.7	4.8	6.0	7.5

2.3 Outdoor unit selection

2.3.1 Assume the indoor unit and outdoor unit combination as follows

2.3.1.1 Calculate the total nominal capacity of indoor units in the combination according to the above table:

$$2.2 \times 1 + 2.8 \times 1 + 3.6 \times 1 + 4.5 \times 1 + 5.6 \times 1 + 7.1 \times 1 = 25.8\text{kW}$$

2.3.1.2 Select outdoor unit: MDV-280(10)W/DRN1(B) which has nominal cooling capacity: 28kW.

Calculate the proportion between ① and ②: $25.8/28 = 92\%$

2.3.2 Result : Because the proportion is within 50~130%, it is a "Right" selection.

2.3.3 Real function data with indoor unit combination

- For the 92% combination, calculate the cooling capacity of outdoor unit (MDV-280(10)W/DRN1(B)).

26.65KW ← 90% (Indoor temperature : **WB 20°C**, Outdoor temperature: **DB 35°C**)

29.61KW ← 100% (Indoor temperature : **WB 20°C**, Outdoor temperature: **DB 35°C**)

Then calculated the outdoor capacity in 92% combination index:

Therefore: $26.65 + \{(29.61 - 26.65) / 10\} \times 2 = 27.24$;

- Outdoor unit (MDV-280(10)W/DRN1(C)) cooling temperature: DB 35°C
- Capacity modification coefficient with pipe length (50m) and height difference (30m): 0.958
- Each indoor unit cooling capacity

MDV-D22T2: $27.24 \times 22/258 \times 0.958 = 2.22(\text{kW})$

MDV-D28T2: $27.24 \times 28/258 \times 0.958 = 2.83(\text{kW})$

MDV-D36T2: $27.24 \times 36/258 \times 0.958 = 3.64(\text{kW})$

MDV-D45T2: $27.24 \times 45/258 \times 0.958 = 4.55(\text{kW})$

MDV-D56T2: $27.24 \times 56/258 \times 0.958 = 5.66(\text{kW})$

MDV-D71T2: $27.24 \times 71/258 \times 0.958 = 7.18(\text{kW})$

Location	Room A	Room B	Room C	Room D	Room E	Room F
Load (kW)	2.1	2.8	3.5	4.6	5.8	7.2
Unit size	22	28	36	45	56	71
Capacity (kW)	2.22	2.83	3.64	4.55	5.66	7.18

2.4 Conclusion

Generally, we think this result is acceptable, so we can think we have accomplished the calculation. But if you think this result is not acceptable, you can repeat the above process.

Remark: In this sample, we don't consider the other capacity modification index and assume them are 1.0.

For more details about the effect factor such as outside ambient/inside ambient DB/WD , please refer to the performance table of indoor and outdoor units.

Part 3 Specification & Performance

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1. Specifications

Factory model			MDV-252(8)W/DRN1(C)	MDV-280(10)W/DRN1(C)	MDV-335(12)W/DRN1(C)
Power supply		V-Ph-Hz	380~415V 3Ph ~ 50Hz	380~415V 3Ph ~ 50Hz	380~415V 3Ph ~ 50Hz
Cooling (*1)	Capacity	W	25200	28000	33500
	Input	W	5875	7198	9054
	EER	W/W	4.29	3.89	3.7
Heating (*2)	Capacity	W	27000	31500	37500
	Input	W	6150	7609	8993
	COP	W/W	4.39	4.14	4.17
Max. input consumption		W	11270	11270	12864
Max. current		A	20.8	22.1	23.7
DC Inverter compressor	Model		E655DHD-65D2YG	E655DHD-65D2YG	E405DHD-36D2YG
	Quantities		1	1	1
	Type		DC Inverter	DC Inverter	DC Inverter
	Brand		Hitachi	Hitachi	Hitachi
	Capacity	W	31590	31590	11800
	Input	W	10340	10340	3665
	Power supply	V-Ph-Hz	380-415V~3Ph, 50Hz	380-415V~3Ph, 50Hz	380-415V~3Ph, 50Hz
	Operating frequency	Hz	40~200	40~200	60~180
	Crankcase	W	27.6+27.6	27.6+27.6	27.6
	Refrigerant oil	ml	FVC68D / 500	FVC68D / 500	FVC68D / 500
Fixed scroll compressor	Model				E655DH-65D2YG(GC)
	Quantities				1
	Type				Fixed scroll
	Brand				Hitachi
	Capacity	W			17100
	Input	W			5740
	Power supply	V-Ph-Hz			380-415V~3Ph, 50Hz
	Locked rotor ampere (LRA)	A			68
	Thermal protector type				Inner
	Crankcase	W			27.6
	Refrigerant oil	ml			FVC68D / 500
Outdoor fan motor	Model		WZDK750-38G-4	WZDK750-38G-4	WZDK560-38G(A)/YDK380-4D-1
	Brand		Panasonic	Panasonic	Panasonic
	Quantities		1	1	1+1
	Insulation class		E	E	E
	Safe class		IPX4	IPX4	IPX4
	Input	W	465	465	465+640
	Output	W	750	750	560+380
	Rated current	A	3.6	3.6	3.6+2.94
	Speed	r/min	800	800	800+1060
Outdoor fan	material		Plastic	Plastic	Plastic
	Type		Axial	Axial	Axial
	Fan Quantities		1	1	2
	Dimension(Dia.xH)	mm	700*202	700*202	560*189
	Vane Quantities of each blower		3	3	3/4
Outdoor coil	Number of rows		2	2	2
	Tube pitch(a)x row pitch(b)	mm	22x19.05	22x19.05	22x19.05
	Fin spacing	mm	1.6	1.6	1.6
	Fin type (code)		Hydrophilic aluminum	Hydrophilic aluminum	Hydrophilic aluminum

	Tube outside dia.	mm	Φ7.94	Φ7.94	Φ7.94
	Tube type		Inner-grooved	Inner-grooved	Inner-grooved
	Coil length x height	mm	1985*1232	1985*1232	2270*1232
	Number of circuits		22	22	22
Outdoor air flow		m ³ /h	11500	11500	15100
External static pressure		Pa	0~20 (default) 20~40 (optional)	0~20 (default) 20~40 (optional)	0~20 (default) 20~60 (optional)
Outdoor sound level (*3)		dB(A)	57	57	59
Outdoor unit	Dimension(W*H*D)	mm	960*1615*765	960*1615*765	1250*1615*765
	Packing (W*H*D)	mm	1025*1790*830	1025*1790*830	1310*1790*825
	Net/Gross weight	Kg	198/213	198/213	268/288
Charged refrigerant type and volume		kg	R410A 9kg	R410A 9kg	R410A 11kg
Throttle type			EXV	EXV	EXV
Excessive operating pressure		MPa	4.4/2.6	4.4/2.6	4.4/2.6
Refrigerant piping	Liquid side/ Gas side (*4)	mm	Φ12.7/Φ25.4	Φ12.7/Φ25.4	Φ12.7/Φ25.4
	Oil balance pipe	mm	Φ6.35	Φ6.35	Φ6.35
	Total pipe length	m	1000	1000	1000
	The farthest pipe length(actual)	m	175	175	175
	The farthest pipe length (equivalent)	m	200	200	200
	The farthest equivalent pipe length from the 1st distributor (*5)	m	40/90	40/90	40/90
	Max. Vertical pipe length (When outdoor units is top)	m	70	70	70
	Max. Vertical pipe length (When outdoor units is bottom)	m	110	110	110
	Max. drop between indoor units	m	30	30	30
Connection wiring	Power wiring	mm ²	4×10+10(L≤20m); 4×16+10(L≤50m)	4×10+10(L≤20m); 4×16+10(L≤50m)	4×10+10(L≤20m); 4×16+10(L≤50m)
	Signal wiring	mm ²	3 core shielded wiring; wiring dia.≥0.75	3 core shielded wiring; wiring dia.≥0.75	3 core shielded wiring; wiring dia.≥0.75
Ambient temp. range - Cooling		℃	-5℃—48℃	-5℃—48℃	-5℃—48℃
Ambient temp. range - Heating		℃	-20℃—21℃	-20℃—21℃	-20℃—21℃

Notes:

1. The cooling conditions: indoor temp.: 27℃ DB(80.6°F), 19℃CWB(60°F) outdoor temp.: 35℃CDB(95°F) equivalent pipe length: 5m drop length: 0m.
2. The heating conditions: indoor temp.: 20℃ DB(68°F), 15℃CWB(44.6°F) outdoor temp.: 7℃CDB(42.8°F) equivalent pipe length: 5m drop length: 0m.
3. Sound level: Anechoic chamber conversion value, measured at a point 1 m in front of the unit at a height of 1.5 m. During actual operation, these values are normally somewhat higher as result of ambient conditions.
4. It's dimension of connecting pipes between outdoor and first branch joint when the Max. Equivalent length of tubing is less than 90m.
5. The farthest equivalent pipe length should be equal to or shorter than 40m, But it can be up to 90m if meet the required conditions following part 4 installation section
6. The above data may be changed without notice for future improvement on quality and performance.

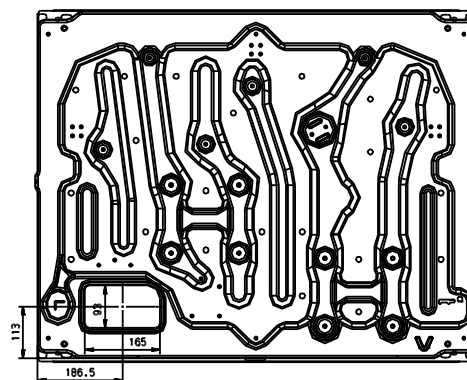
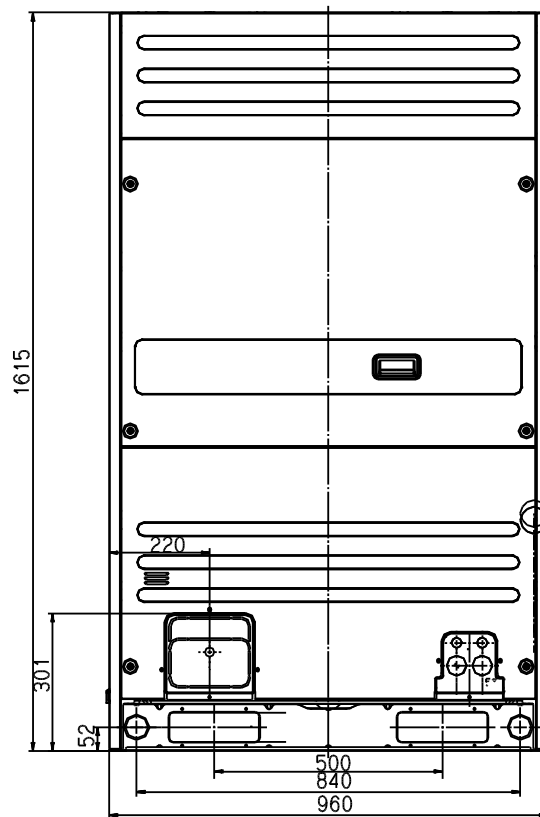
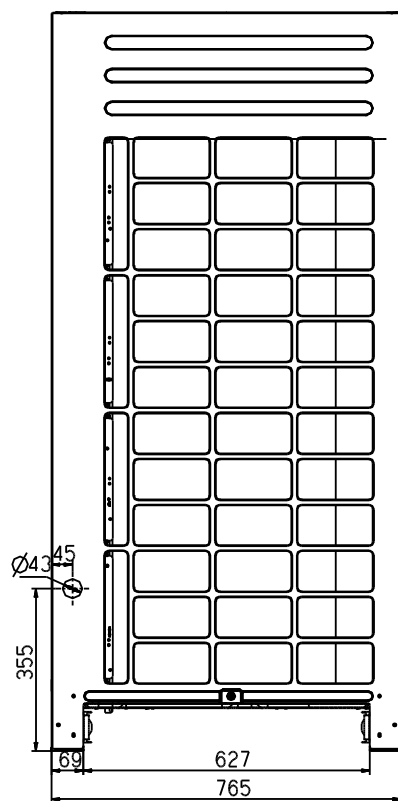
Factory model			MDV-400(14)W/DRN1(C)	MDV-450(16)W/DRN1(C)
Power supply		V-Ph-Hz	380~415V 3Ph ~ 50Hz	380~415V 3Ph ~ 50Hz
Cooling (*1)	Capacity	W	40000	45000
	Input	W	12308	14019
	EER	W/W	3.25	3.21
Heating (*2)	Capacity	W	45000	50000
	Input	W	11194	12787
	COP	W/W	4.02	3.91
Max. input consumption		W	16530	18486
Max. current		A	31.8	32.8
DC Inverter compressor	Model		E655DHD-65D2YG	E655DHD-65D2YG
	Quantities		1	1
	Type		DC Inverter	DC Inverter
	Brand		Hitachi	Hitachi
	Capacity	W	31590	31590
	Input	W	10340	10340
	Power supply	V-Ph-Hz	380-415V~3Ph, 50Hz	380-415V~3Ph, 50Hz
	Operating frequency	Hz	40~200	40~200
	Crankcase	W	27.6+27.6	27.6+27.6
	Refrigerant oil	ml	FVC68D / 500	FVC68D / 500
Fixed scroll compressor	Model		E605DH-59D2YG	E655DH-65D2YG(GC)
	Quantities		1	1
	Type		Fixed scroll	Fixed scroll
	Brand		Hitachi	Hitachi
	Capacity	W	15390	17100
	Input	W	5130	5740
	Power supply	V-Ph-Hz	380-415V~3Ph, 50Hz	380-415V~3Ph, 50Hz
	Locked rotor ampere (LRA)	A	62	68
	Thermal protector type		Inner	Inner
	Crankcase	W	27.6	27.6
	Refrigerant oil	ml	FVC68D / 500	FVC68D / 500
Outdoor fan motor	Model		WZDK560-38G(A)/YDK380-4D-1	WZDK560-38G(A)/YDK380-4D-1
	Brand		Panasonic	Panasonic
	Quantities		1+1	1+1
	Insulation class		E	E
	Safe class		IPX4	IPX4
	Input	W	465+640	465+640
	Output	W	560+380	560+380
	Rated current	A	3.6+2.94	3.6+2.94
	Speed	r/min	800+1060	800+1060
Outdoor fan	material		Plastic	Plastic
	Type		Axial	Axial
	Fan Quantities		2	2
	Dimension(Dia.xH)	mm	560*189	560*189
	Vane Quantities of each blower		3/4	3/4
Outdoor coil	Number of rows		2	2
	Tube pitch(a)x row pitch(b)	mm	22x19.05	22x19.05
	Fin spacing	mm	1.6	1.6

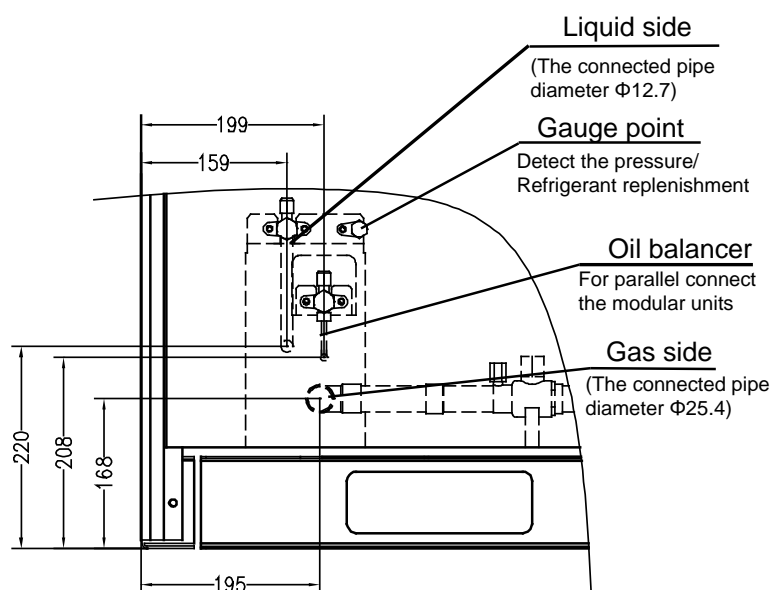
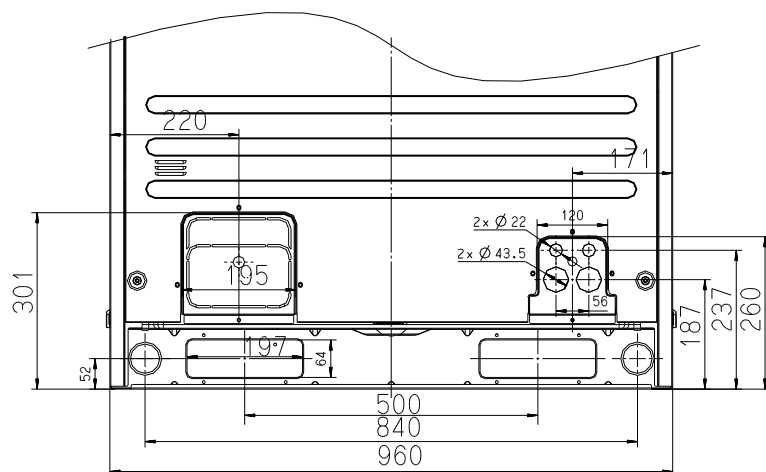
	Fin type (code)		Hydrophilic aluminum	Hydrophilic aluminum
	Tube outside dia.	mm	Φ7.94	Φ7.94
	Tube type		Inner-grooved	Inner-grooved
	Coil length x height	mm	2270*1232	2270*1232
	Number of circuits		22	22
Outdoor air flow		m ³ /h	15100	15100
External static pressure		Pa	0~20 (default) 20~40 (optional)	0~20 (default) 20~40 (optional)
Outdoor sound level (*3)		dB(A)	60	60
Outdoor unit	Dimension(W*H*D)	mm	1250*1615*765	1250*1615*765
	Packing (W*H*D)	mm	1310*1790*825	1310*1790*825
	Net/Gross weight	Kg	280/300	280/300
Charged refrigerant type and volume		kg	R410A 13kg	R410A 13kg
Throttle type			EXV	EXV
Excessive operating pressure		MPa	4.4/2.6	4.4/2.6
Refrigerant piping	Liquid side/ Gas side (*4)	mm	Φ15.9/Φ31.8	Φ15.9/Φ31.8
	Oil balance pipe	mm	Φ6.35	Φ6.35
	Total pipe length	m	1000	1000
	The farthest pipe length(actual)	m	175	175
	The farthest pipe length (equivalent)	m	200	200
	The farthest equivalent pipe length from the 1st distributor (*5)	m	40/90	40/90
	Max. Vertical pipe length (When outdoor units is top)	m	70	70
	Max. Vertical pipe length (When outdoor units is bottom)	m	110	110
	Max. drop between indoor units	m	30	30
Connection wiring	Power wiring	mm ²	4×16+16(L≤20m); 4×25+16(L≤50m)	4×16+16(L≤20m); 4×25+16(L≤50m)
	Signal wiring	mm ²	3 core shielded wiring; wiring dia.≥0.75	3 core shielded wiring; wiring dia.≥0.75
Ambient temp. range - Cooling		℃	-5℃—48℃	-5℃—48℃
Ambient temp. range - Heating		℃	-20℃—21℃	-20℃—21℃

Notes:

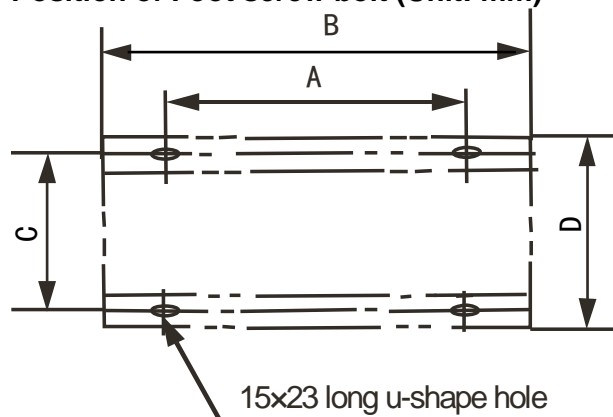
1. The cooling conditions: indoor temp.: 27℃ DB(80.6°F), 19℃CWB(60°F) outdoor temp.: 35℃CDB(95°F) equivalent pipe length: 5m drop length: 0m.
2. The heating conditions: indoor temp.: 20℃ DB(68°F), 15℃CWB(44.6°F) outdoor temp.: 7℃CDB(42.8°F) equivalent pipe length: 5m drop length: 0m.
3. Sound level: Anechoic chamber conversion value, measured at a point 1 m in front of the unit at a height of 1.5 m. During actual operation, these values are normally somewhat higher as result of ambient conditions.
4. It's dimension of connecting pipes between outdoor and first branch joint when the Max. Equivalent length of tubing is less than 90m.
5. The farthest equivalent pipe length should be equal to or shorter than 40m, But it can be up to 90m if meet the required conditions following part 4 installation section
6. The above data may be changed without notice for future improvement on quality and performance.

2.1 Units Dimension

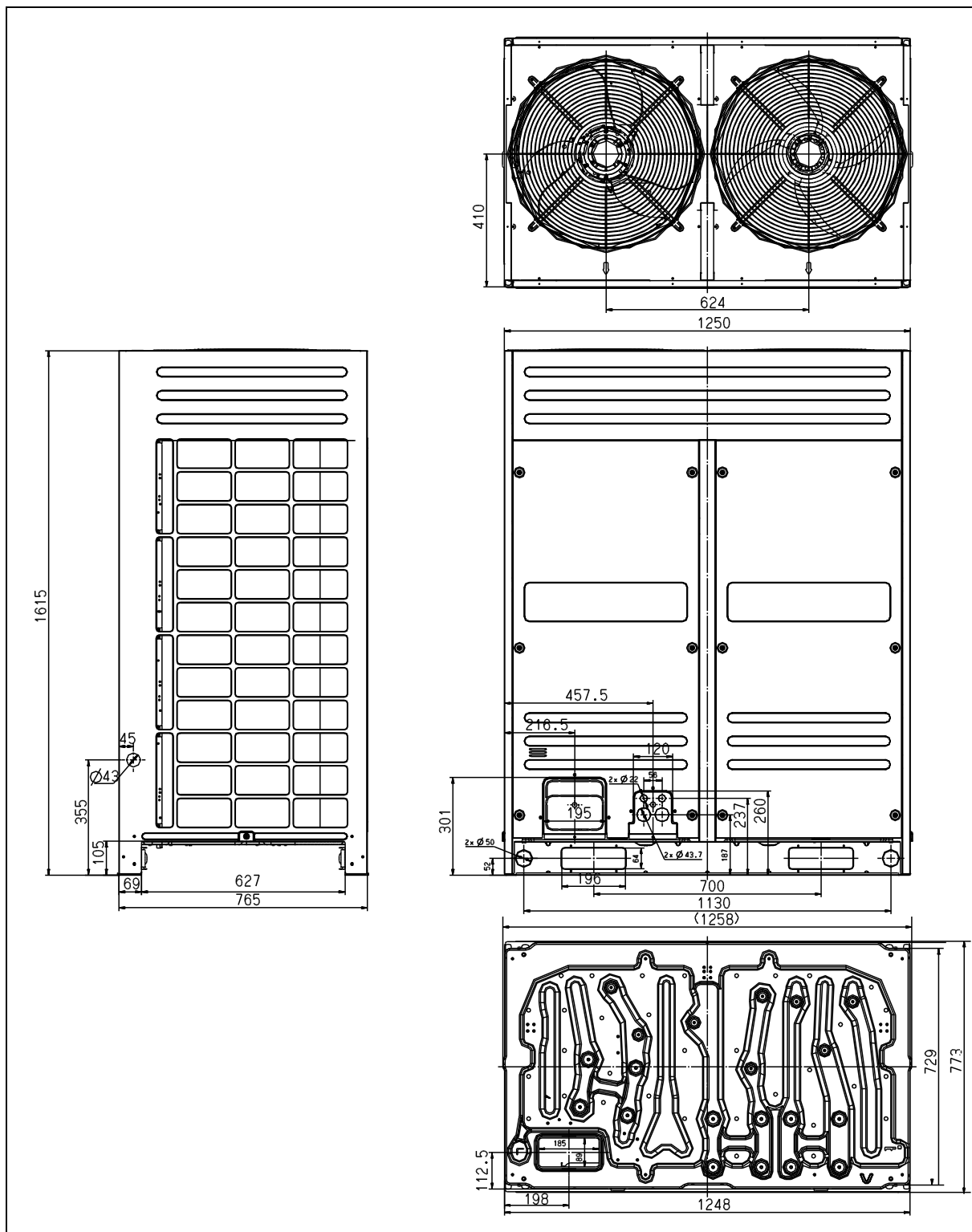


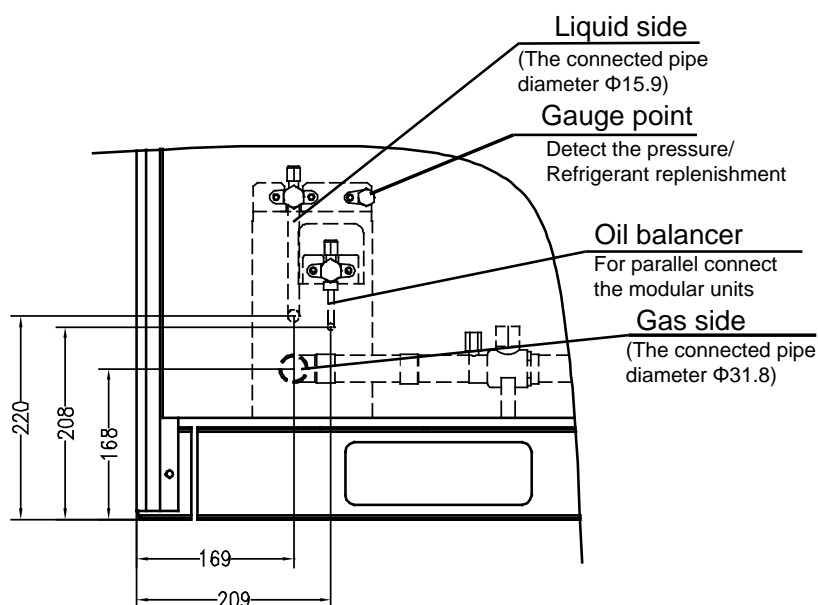
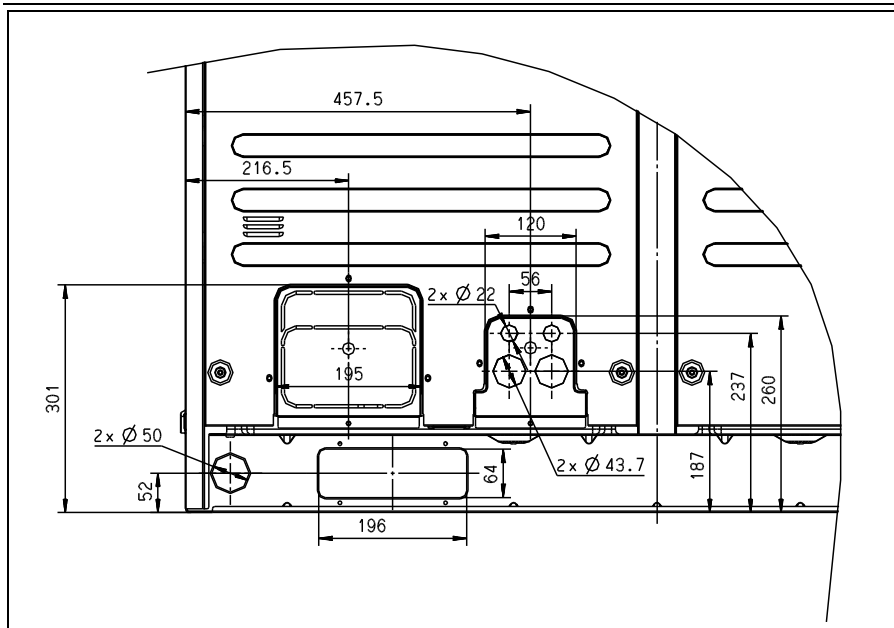


Position of Foot screw bolt (Unit: mm)

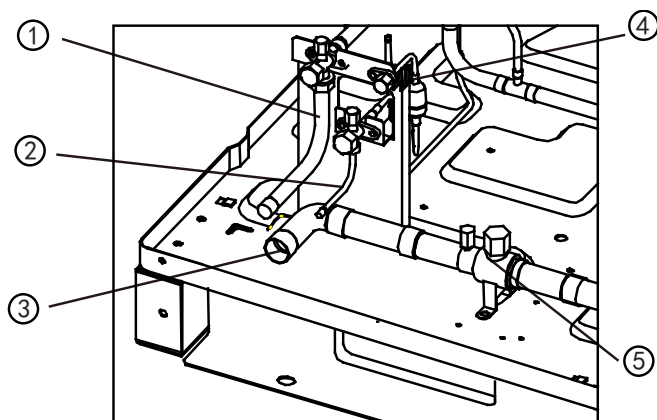


	For 8,10HP	For 12,14,16HP
A	700	1120
B	960	1250
C	736	736
D	765	765

2.2 12HP/14HP/16HP (Combinable) Dimensions:



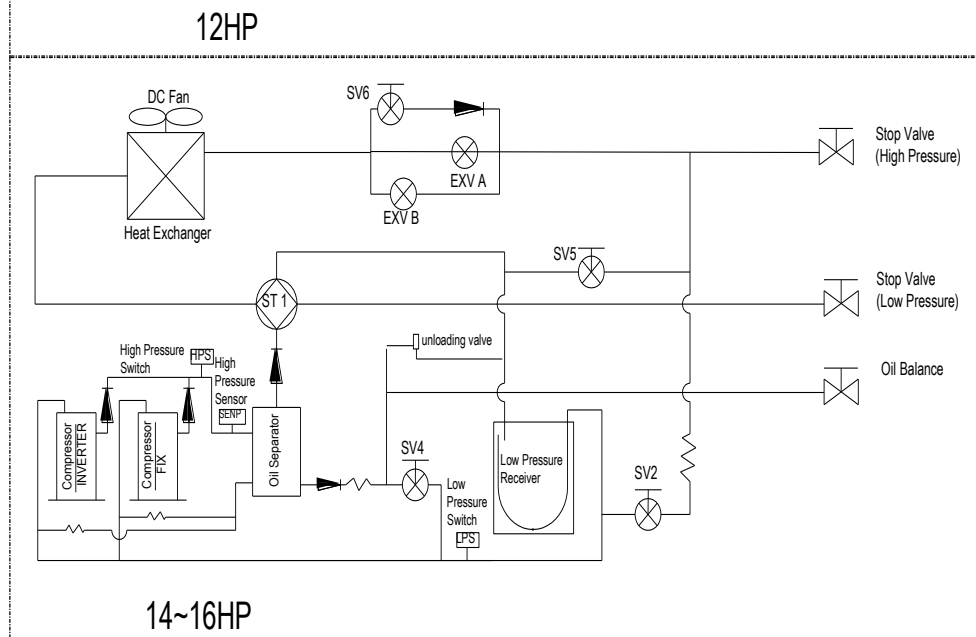
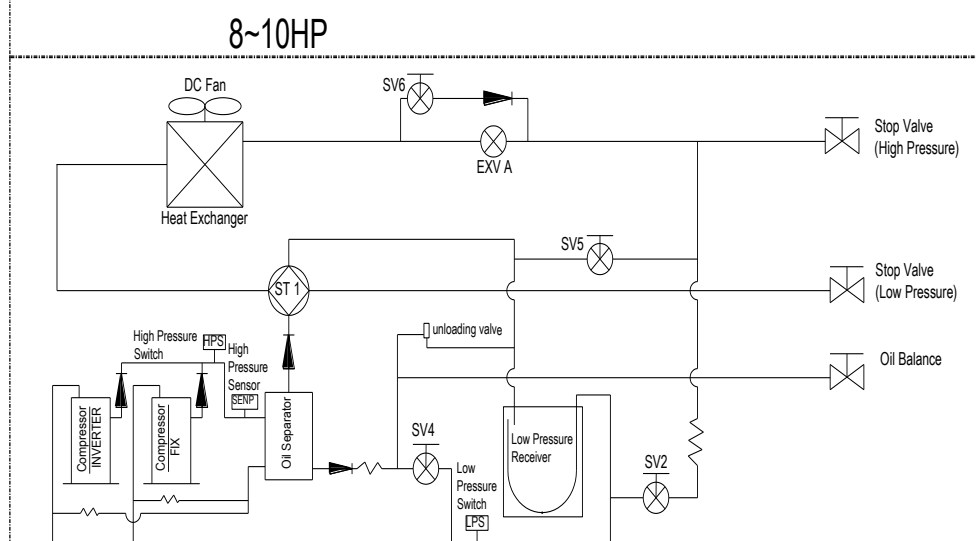
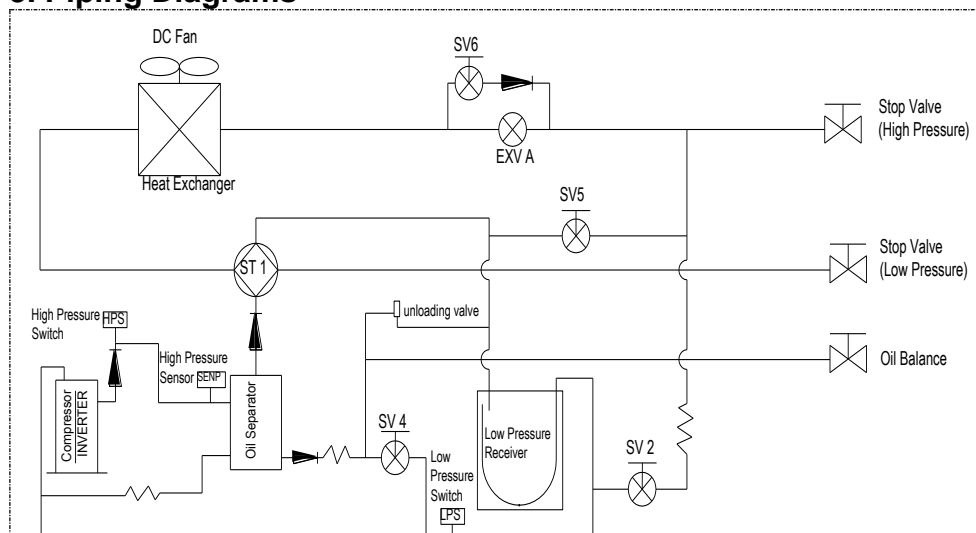
2.3 Valve explanation



- ① Connect the liquid pipe (accessory, field installation)
- ③ Connect the gas pipe
- ⑤ Low pressure float valve

- ② Oil balance pipe (only for combination)
- ④ Low pressure float valve

3. Piping Diagrams



Remark:

- 1, 8~10 HP models only have one inverter compressor.
- 2, 12HP has one big capacity inverter compressor and a small fix scroll compressor.
- 3, 14~16HP models have two EXV part at the high-pressure pipe side, different with 12HP model.

Key Components:

Oil Separator: used to separate oil from high pressure & temperature gas refrigerant, which is pumped out from compressor. The separation efficiency is up to 99%, it makes the oil return back to each compressor very soon.

Low pressure receiver: It is used to store the liquid refrigerant and oil, it can protect the compressor from liquid hammer.

Four-way valve control (ST1): Closes in cooling mode and opens in heating mode

EXV (electromagnetic expansion valve) control:

1) Max. Open degree is 480 pulses.

2) Generally, when system is plug in the EXV closes 700pulse first, then opens to 350 pulse and stand by. When then the unit started, it opens to the right pulse.

3) When the running outdoor unit receives OFF signal, the EXV of slave unit will stop, while master unit is running and slave unit stopped at the same time. If all outdoor units stopped, the EXV will close first, and then open to the pulse of stand-by.

4) 8HP~12HP models have one EXV; 14~16HP models have double EXVs

SV2: spray a little liquid refrigerant to cooling compressor. Open when any compressor discharge temperature is higher than 100℃.

SV4: oil returning valve. Opens after the DC inverter compressor has been run for 5 minutes and then closes 15 minutes later. (For the system has only one outdoor unit).

Every 20 minutes, SV4 of each outdoor unit opens for 3 minutes. (For the system has more than one outdoor unit)

SV5: for defrosting. In defrosting mode, the opening of SV5 can cut the refrigerant flowing circle, so the defrosting process will takes less time. In cooling mode, it is always off.

SV6: for by-pass. Closed when the unit stands by and system is running at heating mode. Open when the discharge temperature is over-high in cooling mode, and close when the unit is standby or system is in heating mode.

Hi pressure sensor: To supervisor the discharge pressure of the compressor and to control the DC fan speed.

For example.

Cooling mode launch sequence (The unit has accomplish commissioning):

Plug in and unit start-----SV4, SV5 open—60s later— SV5 closed —60s later— SV4 closed —40s later—
 Inverter compressor start at 40hz —50s later— Inverter compressor start at 30hz 20s later— Fix scroll
 compressor start (This step is omitted for 8HP&10HP models)—40s later— Inverter compressor running
 frequency will adjust according the capacity requirement.

4. Electric Characteristics

Model	Outdoor Unit				Power Supply			Compressor		OFM	
	Hz	Voltage	Min.	Max.	MCA	TOCA	MFA	MSC	RLA	KW	FLA
MDV-252(8)W/DRN1(C)	50	380~415	342	440	21.8	24.5	25	-	17.4	0.424	4.4
MDV-280(10)W/DRN1(C)	50	380~415	342	440	21.8	24.5	25	-	17.4	0.424	4.4
MDV-335(12)W/ DRN1(C)	50	380~415	342	440	20	24.5	40	-/68	6.2/9.8	0.424	4.4
MDV-400(14)W/ DRN1(C)	50	380~415	342	440	32.8	33	40	-/62	17.4/8.8	0.42+0.38	4.2+2.9
MDV-450(16)W/ DRN1(C)	50	380~415	342	440	34	33	50	-/68	17.4/9.8	0.42+0.38	4.2+2.9

Remark:

MCA: Min. Current Amps. (A)

TOCA: Total Over-current Amps. (A)

MFA: Max. Fuse Amps. (A)

MSC: Max. Starting Amps. (A)

RLA: Rated Load Amps. (A)

OFM: Outdoor Fan Motor.

FLA: Full Load Amps. (A)

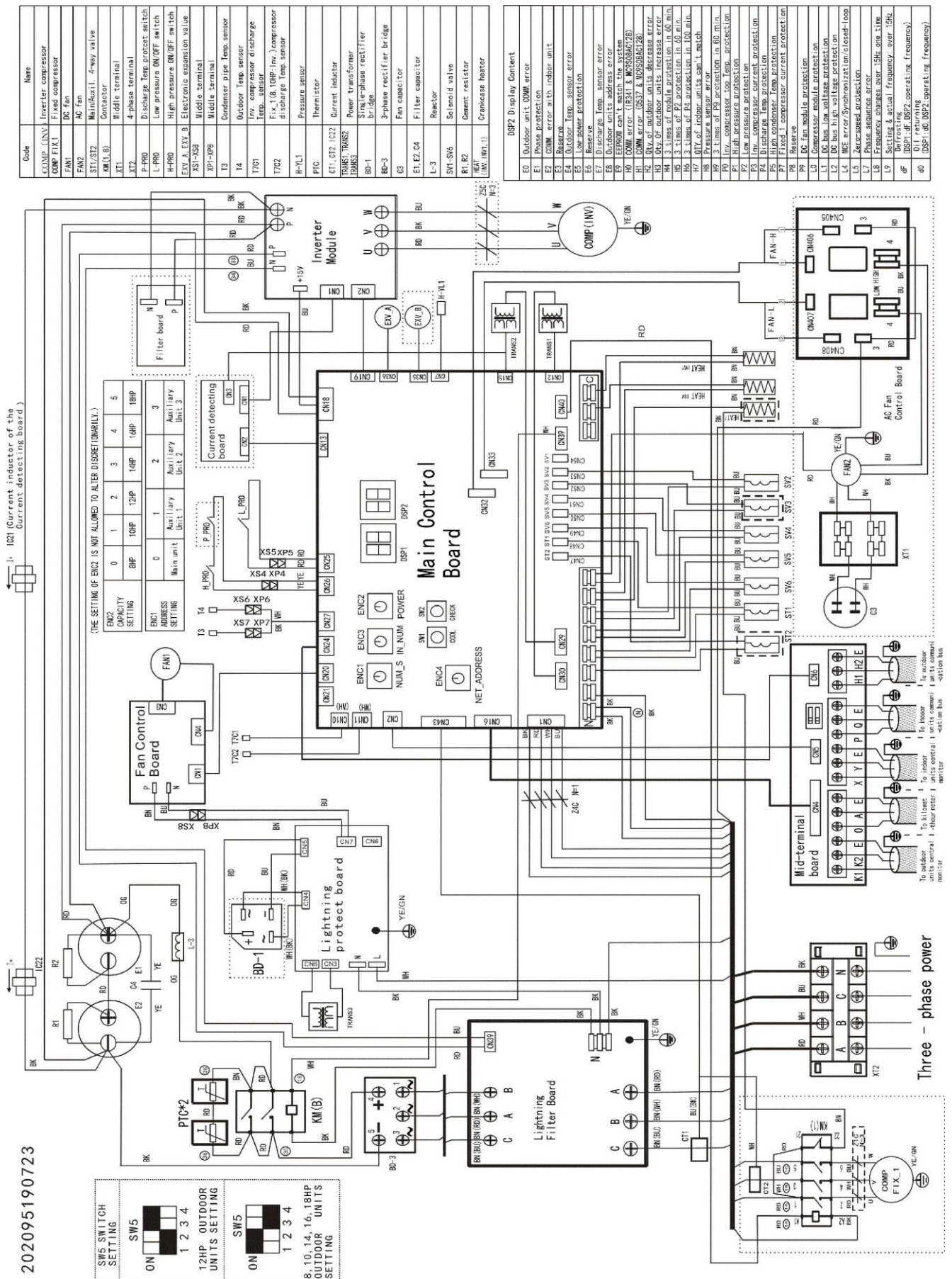
KW: Rated Motor Output (KW)

Notes:

1. RLA is based on the following conditions, Indoor temp. 27°C DB/19°C WB, Outdoor temp. 35°C DB
2. TOCA means the total value of each OC set.
3. MSC means the Max. current during the starting of compressor.
4. Voltage range. Units are suitable for use on electrical systems where voltage supplied to unit terminals is not below or above listed range limits.
5. Maximum allowable voltage variation between phases is 2%
6. Selection wire size based on the larger value of MCA or TOCA
7. MFA is used to select the circuit breaker and the ground fault circuit interrupter (earth circuit breaker).

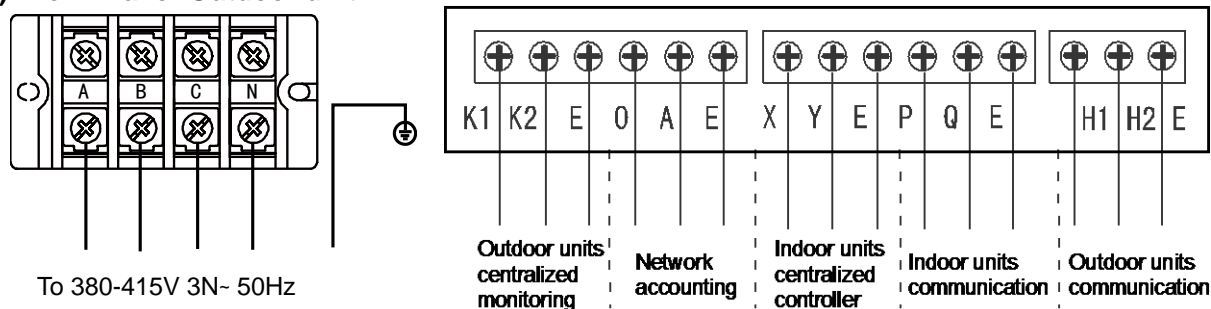
5. Wiring Diagrams and Field Wiring

5.1 Wiring Diagrams for 8~16HP

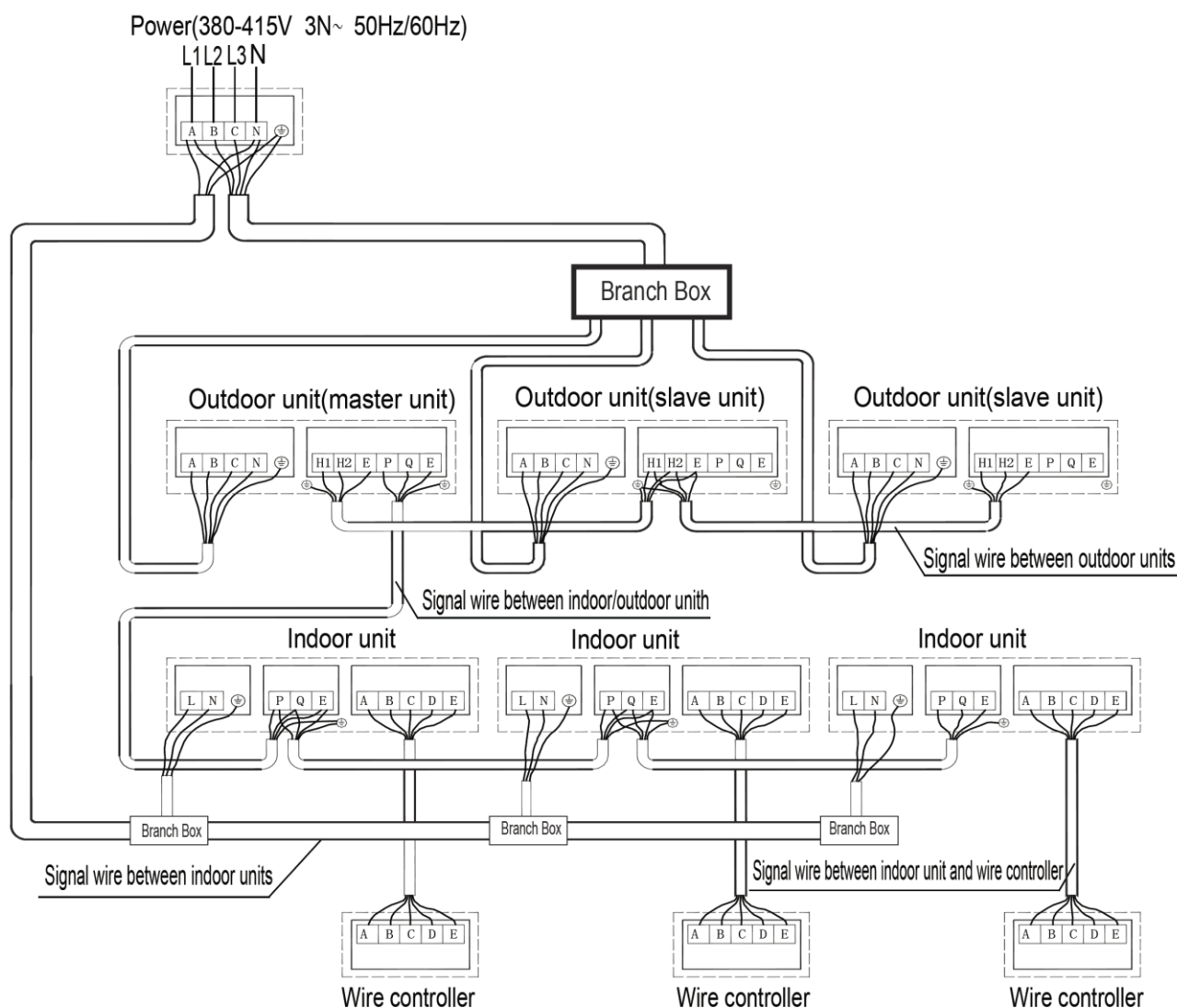


1.2 Field Wiring

a) Terminal of Outdoor unit



b) Wiring between Indoor and Outdoor unit



Note:

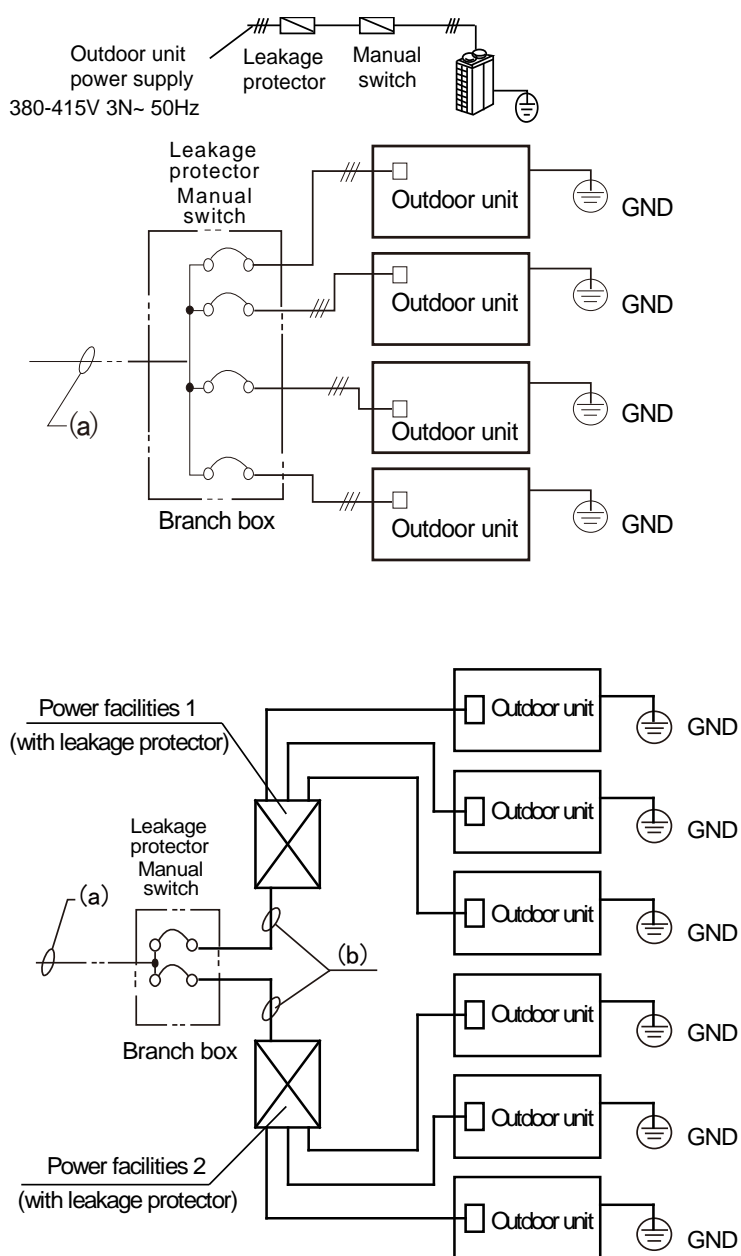
1. The signal connecting line between outdoor units, indoor and outdoor units and indoor units has polarity. When connecting, be careful to prevent error connection.
2. Signal line shall adopt three-core shielded wire with an area above 0.75 mm^2 .
3. Do not bind signal line and copper pipe together with belting.
4. Make sure that the shield metal layer should be grounded well indoor control box in order to prevent interference.
5. It's forbidden to connect 200V or above high-volt live wire to the communication terminal.

1.3 Outdoor unit power wiring

5.3.1 Separate Power Supply (without power facility)

Model \ Item	Power supply	Minimum Power wire diameter (mm ²)		manual switch (A)		Leakage protector
		Wiring of mental and synthetic resin		Capacity	Fuse	
		Size	Ground wire			
MDV-252(8)W/DRN1(C)	380V~415V, 3N, 50Hz	4*10mm ² (L≤20m)	10	32	25	100 mA under 0.1sec
MDV-280(10)W/DRN1(C)		4*16mm ² (L≤50m)		50	40	
MDV-335(12)W/DRN1(C)		4*16mm ² (L≤20m)	16	50	40	
MDV-400(14)W/DRN1(C)		4*25mm ² (L≤50m)		63	50	
MDV-450(16)W/DRN1(C)						

5.3.2 With power facilities:



Note:

- 1, Select power cord for these five models separately according to relevant standard. 8HP, 10HP, 12HP, 14HP, 16HP.
- 2, The wiring diameter and the length in the table indicate the condition that the voltage dropping range is within 2%. If the length exceeds the above figure, please select the wire diameter according to relevant standard.

- 3, Select the wire diameter

Power wiring refer to the main wire (a) connecting to branch box and the wiring (b) between branch box and power facilities. Please select the wire diameter according to the following requirement.

- 4, Diameter of main wire (a)

Depend on the total horsepower of outdoor unit and following table.

E.g In system:(8Hp×1unit+8Hp×1unit+10Hp×1unit)

Total Hp=26Hp→(Table.6-4)→size of wire=35mm²(within 50m)

- 5, Wiring (b):between branch box and power equipment. Depends on the number of combined outdoor unit. If fewer than 5, the diameter is the same as that of main wire (a); if more than 6, there will be 2 electric control boxes, and the diameter of wiring depends on the total horsepower of outdoor units connecting to each electric control box and following table.

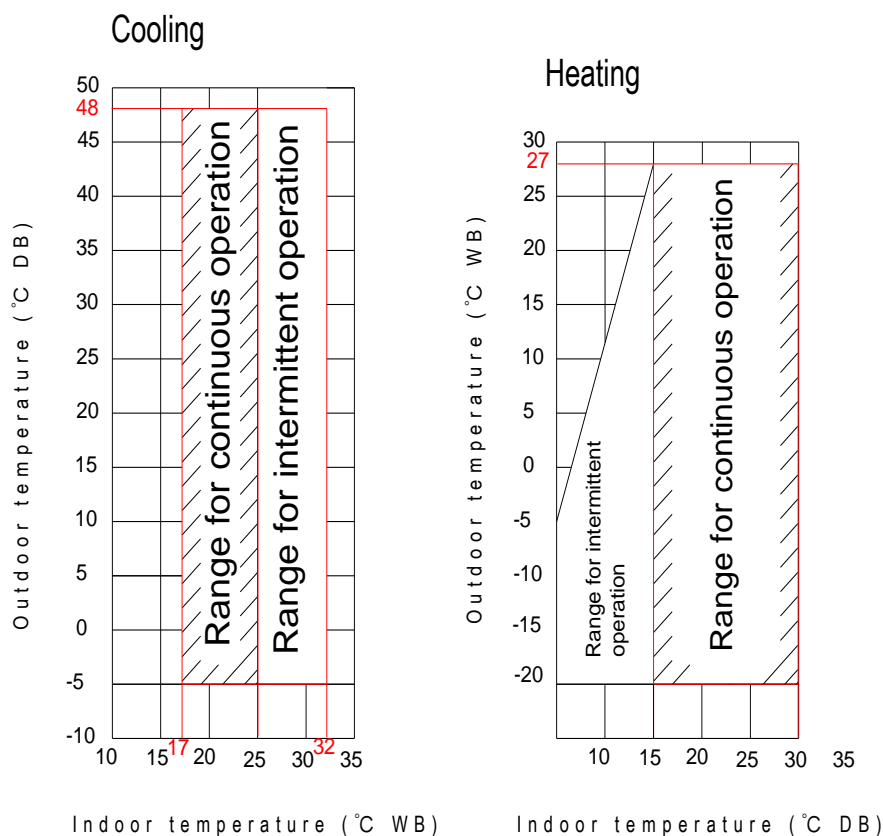
5.3.3 Reference table of the cable size for each capacity

Total capacity (HP)	Min. Diameter of wiring (mm ²)	
	from weather proof isolator to ODU	
	Below 20 m	20 to 50 m
8	10	16
10	10	16
12	10	16
14	16	25
16	16	25
18	16	25
20	25	35
22	25	35
24	25	35
26	25	35
28	25	35
30	35	50
32	35	50
34	35	50
36	35	50
38	35	50
40	35	50
42	50	70
44	50	70
46	50	70
48	50	70
50	70	95
52	70	95
54	70	95

56	90	110
58	90	110
60	90	110
62	90	110
64	90	110

Remark: The above selection is just for reference, it should be considered that the cable layout, space between cable and surroundings, etc. for an actual electrical project

6. Operation Limits



	Outdoor temp.	Indoor temp.	Room relative humidity
Cooling mode	-5°C ~ 48°C	17°C ~ 32°C	below 80%
Heating mode	-20°C ~ 27°C	15°C ~ 30°C	—

Notes:

1. If the unit is running outside the above condition, protective device will start, and even then the units take place abnormality running.
2. These figures base on the operation conditions between indoor units and outdoor units: Equivalent pipe length is 5m, and height difference is 0m.

Precaution:

The indoor relative humidity should be lower than 80%. If the air conditioner works in an environment with a relative humidity higher than mentioned above, the surface of the air conditioner may condensate. In this case, it is recommended to set the air speed of the indoor unit to high.

7. Capacity Tables

8HP cooling mode

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(° C DB/WD)													
		DB:20.8,WB:1		DB:23.3,WB:1		DB:25.8,WB:1		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:2		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
130%	-5	22.14	2.40	26.37	2.93	30.60	3.14	31.77	3.27	33.30	3.36	34.11	3.66	34.97	3.68
	-2	22.14	2.40	26.37	2.99	30.60	3.14	31.77	3.29	33.30	3.36	34.11	3.70	34.97	3.72
	0	22.14	2.44	26.37	3.04	30.60	3.26	31.77	3.47	33.30	3.56	34.11	3.75	34.97	3.77
	2	22.14	2.49	26.37	3.05	30.60	3.37	31.77	3.66	33.30	3.60	34.11	3.78	34.97	3.82
	4	22.14	2.54	26.37	3.11	30.60	3.48	31.77	3.68	33.30	3.65	34.11	3.77	34.97	3.89
	6	22.14	2.59	26.37	3.17	30.60	3.61	31.77	3.71	32.93	3.76	33.69	3.77	34.58	3.92
	8	22.14	2.65	26.37	3.24	30.60	3.79	31.77	3.89	32.52	3.88	33.33	3.90	34.14	3.96
	10	22.14	2.71	26.37	3.31	30.60	3.93	31.77	4.02	32.13	4.04	32.94	4.06	33.75	4.08
	12	22.14	2.76	26.37	3.37	30.60	4.01	31.32	4.03	31.77	4.06	32.49	4.07	33.30	4.10
	14	22.14	2.81	26.37	3.44	30.51	4.05	30.96	4.06	31.32	4.08	32.13	4.09	32.94	4.19
	16	22.14	2.86	26.37	3.51	30.15	4.06	30.51	4.08	30.87	4.10	31.68	4.12	32.49	4.26
	18	22.14	2.91	26.37	3.58	29.70	4.20	30.06	4.22	30.51	4.24	31.32	4.28	32.13	4.32
	20	22.14	2.98	26.37	3.81	29.25	4.40	29.70	4.43	30.06	4.45	30.87	4.49	31.68	4.54
	21	22.14	3.06	26.37	3.94	29.07	4.51	29.52	4.53	29.88	4.55	30.69	4.60	31.50	4.64
	23	22.14	3.28	26.37	4.23	28.71	4.71	29.07	4.73	29.43	4.76	30.24	4.81	31.05	4.85
	25	22.14	3.50	26.37	4.53	28.26	4.92	28.62	4.94	29.07	4.97	29.88	5.02	30.69	5.07
	27	22.14	3.74	26.37	4.85	27.90	5.12	28.26	5.15	28.62	5.18	29.43	5.23	30.24	5.29
	29	22.14	3.99	26.37	5.18	27.45	5.33	27.81	5.36	28.26	5.39	29.07	5.45	29.88	5.50
	31	22.14	4.26	26.28	5.48	27.00	5.54	27.45	5.57	27.81	5.60	28.62	5.66	29.43	5.72
	33	22.14	4.54	25.83	5.68	26.64	5.75	27.00	5.78	27.45	5.81	28.26	5.87	28.98	5.94
	35	22.14	4.84	25.38	5.89	26.19	5.96	26.64	5.99	27.00	6.03	27.81	6.10	28.62	6.16
	37	22.14	5.15	25.02	6.10	25.83	6.18	26.19	6.21	26.64	6.25	27.36	6.32	28.17	6.39
	39	22.14	5.48	24.57	6.17	25.38	6.38	25.83	6.42	26.19	6.46	27.00	6.53	27.81	6.61
	41	22.14	5.77	24.32	6.23	25.11	6.44	25.56	6.48	25.92	6.52	26.73	6.54	26.74	6.67
	43	22.14	5.91	24.14	6.26	24.98	6.46	25.43	6.51	25.66	6.53	26.25	6.56	26.42	6.69
	45	22.14	6.21	23.99	6.32	24.71	6.52	25.16	6.55	25.28	6.56	25.53	6.58	25.91	6.81
	48	22.14	5.02	24.84	4.84	26.94	5.02	27.44	4.98	27.66	5.00	27.54	5.00	28.04	5.40
120%	-5	20.43	2.32	24.30	2.81	28.26	3.32	30.24	3.62	31.68	3.78	32.40	3.90	33.12	4.00
	-2	20.43	2.34	24.30	2.84	28.26	3.35	30.24	3.64	31.68	3.82	32.40	3.93	33.12	4.01
	0	20.43	2.36	24.30	2.86	28.26	3.39	30.24	3.65	31.68	3.85	32.40	3.95	33.12	4.02
	2	20.43	2.37	24.30	2.89	28.26	3.42	30.24	3.69	31.68	3.87	32.40	3.98	33.12	4.03
	4	20.43	2.39	24.30	2.92	28.26	3.46	30.24	3.72	31.68	3.92	32.40	3.99	33.12	4.04
	6	20.43	2.42	24.30	2.95	28.26	3.51	30.24	3.76	31.68	3.96	32.40	4.02	33.12	4.05
	8	20.43	2.44	24.30	2.98	28.26	3.55	30.24	3.81	31.68	4.00	32.40	4.04	33.12	4.07
	10	20.43	2.47	24.30	3.02	28.26	3.59	30.24	3.88	31.68	4.01	32.40	4.05	33.12	4.09
	12	20.43	2.52	24.30	3.07	28.26	3.66	30.24	3.95	31.23	4.02	31.95	4.03	32.67	4.12
	14	20.43	2.57	24.30	3.14	28.26	3.73	30.24	4.03	30.78	4.05	31.59	4.09	32.31	4.17
	16	20.43	2.61	24.30	3.20	28.26	3.80	30.06	4.10	30.42	4.11	31.14	4.16	31.86	4.23
	18	20.43	2.66	24.30	3.26	28.26	3.93	29.61	4.20	29.97	4.21	30.69	4.25	31.50	4.29
	20	20.43	2.72	24.30	3.39	28.26	4.23	29.25	4.40	29.61	4.42	30.33	4.46	31.05	4.50
	21	20.43	2.74	24.30	3.51	28.26	4.38	28.98	4.50	29.34	4.52	30.15	4.56	30.87	4.61
	23	20.43	2.93	24.30	3.76	28.26	4.69	28.62	4.70	28.98	4.73	29.70	4.77	30.42	4.81
	25	20.43	3.13	24.30	4.02	27.81	4.89	28.17	4.91	28.53	4.93	29.34	4.98	30.06	5.03
	27	20.43	3.34	24.30	4.30	27.45	5.09	27.81	5.12	28.17	5.15	28.89	5.19	29.61	5.24
	29	20.43	3.56	24.30	4.59	27.00	5.30	27.36	5.33	27.72	5.35	28.44	5.41	29.25	5.45
	31	20.43	3.80	24.30	4.90	26.55	5.51	27.00	5.53	27.36	5.57	28.08	5.62	28.80	5.68
	33	20.43	4.05	24.30	5.23	26.19	5.72	26.55	5.75	26.91	5.77	27.63	5.83	28.35	5.89
	35	20.43	4.31	24.30	5.57	25.74	5.92	26.10	5.95	26.55	5.98	27.27	6.05	27.99	6.11
	37	20.43	4.58	24.30	5.94	25.38	6.14	25.74	6.17	26.10	6.20	26.82	6.26	27.54	6.33
	39	20.43	4.88	24.21	6.27	24.93	6.34	25.29	6.38	25.65	6.41	26.46	6.48	27.18	6.55
	41	20.43	5.01	24.01	6.31	24.73	6.39	25.09	6.43	25.45	6.46	26.26	6.50	26.40	6.60
	43	20.43	5.08	23.89	6.36	24.54	6.42	24.90	6.45	25.26	6.48	25.81	6.52	25.99	6.73
	45	20.43	5.14	23.76	6.42	24.30	6.48	24.64	6.51	25.04	6.53	25.29	6.54	25.73	6.87
	48	23.67	3.35	27.29	4.17	27.80	4.22	28.09	4.27	28.69	4.26	28.84	4.20	29.42	4.46
110%	-5	18.72	2.02	22.32	2.52	25.92	3.01	27.72	3.23	29.52	3.47	31.77	3.61	32.49	3.72
	-2	18.72	2.06	22.32	2.55	25.92	3.03	27.72	3.26	29.52	3.50	31.77	3.64	32.49	3.74
	0	18.72	2.08	22.32	2.57	25.92	3.06	27.72	3.28	29.52	3.54	31.77	3.68	32.49	3.78

	2	18.72	2.13	22.32	2.59	25.92	3.10	27.72	3.32	29.52	3.58	31.77	3.73	32.49	3.83
	4	18.72	2.17	22.32	2.62	25.92	3.13	27.72	3.36	29.52	3.63	31.77	3.78	32.49	3.87
	6	18.72	2.19	22.32	2.65	25.92	3.16	27.72	3.41	29.52	3.67	31.77	3.82	32.49	3.93
	8	18.72	2.21	22.32	2.69	25.92	3.20	27.72	3.45	29.52	3.72	31.77	3.85	32.49	3.97
	10	18.72	2.24	22.32	2.73	25.92	3.25	27.72	3.51	29.52	3.78	31.77	3.88	32.49	4.00
	12	18.72	2.29	22.32	2.79	25.92	3.31	27.72	3.58	29.52	3.85	31.41	3.93	32.04	4.05
	14	18.72	2.33	22.32	2.83	25.92	3.37	27.72	3.64	29.52	3.92	30.96	3.97	31.68	4.08
	16	18.72	2.37	22.32	2.89	25.92	3.44	27.72	3.71	29.52	4.00	30.60	4.01	31.23	4.13
	18	18.72	2.41	22.32	2.95	25.92	3.51	27.72	3.82	29.52	4.19	30.15	4.22	30.87	4.26
	20	18.72	2.46	22.32	3.01	25.92	3.71	27.72	4.10	29.07	4.39	29.79	4.43	30.42	4.47
	21	18.72	2.49	22.32	3.10	25.92	3.85	27.72	4.25	28.89	4.50	29.52	4.53	30.24	4.57
	23	18.72	2.60	22.32	3.32	25.92	4.12	27.72	4.56	28.44	4.69	29.16	4.74	29.79	4.78
	25	18.72	2.78	22.32	3.55	25.92	4.41	27.72	4.88	28.08	4.90	28.71	4.95	29.43	4.99
	27	18.72	2.96	22.32	3.79	25.92	4.72	27.27	5.09	27.63	5.11	28.35	5.15	28.98	5.20
	29	18.72	3.16	22.32	4.05	25.92	5.04	26.91	5.30	27.27	5.32	27.90	5.37	28.62	5.42
	31	18.72	3.36	22.32	4.31	25.92	5.38	26.46	5.50	26.82	5.53	27.54	5.57	28.17	5.63
	33	18.72	3.58	22.32	4.60	25.74	5.68	26.10	5.71	26.46	5.73	27.09	5.79	27.81	5.84
	35	18.72	3.81	22.32	4.90	25.29	5.88	25.65	5.91	26.01	5.95	26.64	6.00	27.36	6.06
	37	18.72	4.05	22.32	5.22	24.93	6.10	25.29	6.12	25.56	6.15	26.28	6.21	26.91	6.27
	39	18.72	4.31	22.32	5.56	24.48	6.30	24.84	6.33	25.20	6.37	25.83	6.43	26.55	6.49
	41	18.72	4.35	22.32	5.60	24.29	6.35	24.65	6.38	25.01	6.41	25.50	6.47	25.75	6.54
	43	18.72	4.40	22.32	5.67	24.10	6.39	24.46	6.42	24.82	6.45	25.28	6.50	25.36	6.67
	45	18.72	4.54	22.32	5.71	23.85	6.45	24.20	6.50	24.60	6.51	25.02	6.67	25.12	6.82
	48	20.50	3.35	24.45	4.18	25.74	4.72	26.08	4.79	26.63	4.76	26.95	5.18	27.16	5.00
100%	-5	17.01	1.84	20.25	2.22	23.58	2.64	25.20	2.83	26.82	3.07	30.15	3.50	31.86	3.65
	-2	17.01	1.87	20.25	2.25	23.58	2.67	25.20	2.88	26.82	3.11	30.15	3.54	31.86	3.68
	0	17.01	1.89	20.25	2.27	23.58	2.70	25.20	2.92	26.82	3.14	30.15	3.60	31.86	3.72
	2	17.01	1.92	20.25	2.30	23.58	2.73	25.20	2.96	26.82	3.18	30.15	3.65	31.86	3.78
	4	17.01	1.94	20.25	2.33	23.58	2.77	25.20	3.00	26.82	3.22	30.15	3.69	31.86	3.82
	6	17.01	1.96	20.25	2.37	23.58	2.81	25.20	3.05	26.82	3.27	30.15	3.74	31.86	3.88
	8	17.01	2.00	20.25	2.41	23.58	2.86	25.20	3.09	26.82	3.32	30.15	3.80	31.86	3.94
	10	17.01	2.03	20.25	2.45	23.58	2.91	25.20	3.14	26.82	3.38	30.15	3.86	31.86	4.00
	12	17.01	2.06	20.25	2.50	23.58	2.96	25.20	3.20	26.82	3.44	30.15	3.93	31.41	4.03
	14	17.01	2.10	20.25	2.55	23.58	3.02	25.20	3.26	26.82	3.51	30.15	4.01	31.05	4.08
	16	17.01	2.14	20.25	2.60	23.58	3.08	25.20	3.32	26.82	3.58	29.97	4.06	30.60	4.12
	18	17.01	2.18	20.25	2.64	23.58	3.13	25.20	3.39	26.82	3.65	29.61	4.20	30.24	4.23
	20	17.01	2.22	20.25	2.70	23.58	3.23	25.20	3.56	26.82	3.91	29.16	4.39	29.79	4.43
	21	17.01	2.24	20.25	2.72	23.58	3.35	25.20	3.69	26.82	4.05	28.98	4.50	29.61	4.54
	23	17.01	2.30	20.25	2.91	23.58	3.59	25.20	3.95	26.82	4.34	28.62	4.70	29.16	4.74
	25	17.01	2.45	20.25	3.10	23.58	3.84	25.20	4.24	26.82	4.65	28.17	4.91	28.80	4.95
	27	17.01	2.61	20.25	3.31	23.58	4.10	25.20	4.53	26.82	4.97	27.72	5.11	28.35	5.16
	29	17.01	2.78	20.25	3.53	23.58	4.38	25.20	4.84	26.73	5.28	27.36	5.33	27.99	5.37
	31	17.01	2.96	20.25	3.77	23.58	4.67	25.20	5.16	26.37	5.49	26.91	5.53	27.54	5.58
	33	17.01	3.14	20.25	4.01	23.58	4.98	25.20	5.51	25.92	5.69	26.55	5.74	27.18	5.79
	35	17.01	3.34	20.25	4.27	23.58	5.31	25.20	5.87	25.47	5.90	26.10	5.95	26.73	6.00
	37	17.01	3.55	20.25	4.54	23.58	5.66	24.75	6.08	25.11	6.11	25.74	6.17	26.28	6.21
	39	17.01	3.78	20.25	4.83	23.58	6.02	24.39	6.29	24.66	6.32	25.29	6.37	25.92	6.44
	41	17.01	3.95	20.25	5.01	23.58	6.24	24.01	6.33	24.47	6.41	24.85	6.52	25.54	6.57
	43	17.01	4.13	20.25	5.18	23.58	6.36	23.63	6.40	24.29	6.48	25.00	6.57	25.09	6.64
	45	17.01	4.36	20.25	5.42	23.58	6.47	23.13	6.49	24.17	6.59	24.79	6.67	24.59	6.73
	48	17.62	4.58	20.97	5.61	24.42	6.48	22.97	6.39	24.99	6.66	24.11	6.65	24.91	6.71
90%	-5	15.30	1.63	18.27	1.96	21.24	2.31	22.68	2.52	24.12	2.68	27.09	3.08	30.06	3.53
	-2	15.30	1.65	18.27	1.98	21.24	2.34	22.68	2.55	24.12	2.71	27.09	3.11	30.06	3.56
	0	15.30	1.67	18.27	2.00	21.24	2.37	22.68	2.58	24.12	2.75	27.09	3.15	30.06	3.59
	2	15.30	1.70	18.27	2.03	21.24	2.40	22.68	2.62	24.12	2.79	27.09	3.21	30.06	3.64
	4	15.30	1.72	18.27	2.06	21.24	2.44	22.68	2.66	24.12	2.83	27.09	3.26	30.06	3.70
	6	15.30	1.75	18.27	2.10	21.24	2.48	22.68	2.71	24.12	2.88	27.09	3.31	30.06	3.76
	8	15.30	1.78	18.27	2.14	21.24	2.53	22.68	2.75	24.12	2.93	27.09	3.37	30.06	3.79
	10	15.30	1.81	18.27	2.18	21.24	2.58	22.68	2.79	24.12	2.99	27.09	3.42	30.06	3.85
	12	15.30	1.84	18.27	2.22	21.24	2.63	22.68	2.83	24.12	3.05	27.09	3.48	30.06	3.93
	14	15.30	1.88	18.27	2.26	21.24	2.68	22.68	2.89	24.12	3.10	27.09	3.55	30.06	4.00
	16	15.30	1.91	18.27	2.30	21.24	2.73	22.68	2.94	24.12	3.17	27.09	3.62	29.97	4.07
	18	15.30	1.94	18.27	2.35	21.24	2.78	22.68	3.00	24.12	3.23	27.09	3.69	29.61	4.20
	20	15.30	1.98	18.27	2.40	21.24	2.83	22.68	3.06	24.12	3.35	27.09	3.97	29.16	4.39

	21	15.30	1.99	18.27	2.42	21.24	2.88	22.68	3.17	24.12	3.47	27.09	4.11	28.98	4.50
	23	15.30	2.03	18.27	2.52	21.24	3.09	22.68	3.40	24.12	3.72	27.09	4.41	28.53	4.70
	25	15.30	2.15	18.27	2.69	21.24	3.30	22.68	3.63	24.12	3.97	27.09	4.72	28.17	4.91
	27	15.30	2.28	18.27	2.87	21.24	3.52	22.68	3.88	24.12	4.25	27.09	5.05	27.72	5.11
	29	15.30	2.43	18.27	3.06	21.24	3.76	22.68	4.14	24.12	4.54	26.82	5.28	27.36	5.32
	31	15.30	2.58	18.27	3.25	21.24	4.01	22.68	4.42	24.12	4.84	26.37	5.49	26.91	5.53
	33	15.30	2.74	18.27	3.46	21.24	4.27	22.68	4.71	24.12	5.17	26.01	5.70	26.55	5.74
	35	15.30	2.91	18.27	3.68	21.24	4.55	22.68	5.02	24.12	5.51	25.56	5.91	26.10	5.95
	37	15.30	3.09	18.27	3.91	21.24	4.84	22.68	5.34	24.12	5.87	25.11	6.11	25.74	6.16
	39	15.30	3.28	18.27	4.16	21.24	5.15	22.68	5.69	24.12	6.25	24.75	6.33	25.29	6.37
	41	15.30	3.39	18.27	4.35	21.24	5.34	22.68	5.84	24.12	6.29	24.58	6.49	25.12	6.52
	43	15.30	3.55	18.27	4.54	21.24	5.53	22.68	5.99	24.12	6.43	24.45	6.57	24.90	6.62
	45	15.30	3.78	18.27	4.77	21.24	5.76	22.68	6.19	24.12	6.60	24.32	6.64	24.52	6.71
	48	15.30	2.90	18.27	3.60	21.24	4.30	22.68	4.61	24.12	4.81	26.79	4.79	26.51	4.84
80%	-5	13.59	1.44	16.20	1.70	18.81	2.01	20.16	2.14	21.51	2.30	24.12	2.66	26.73	3.04
	-2	13.59	1.46	16.20	1.72	18.81	2.03	20.16	2.17	21.51	2.33	24.12	2.69	26.73	3.07
	0	13.59	1.48	16.20	1.74	18.81	2.05	20.16	2.20	21.51	2.37	24.12	2.73	26.73	3.11
	2	13.59	1.51	16.20	1.77	18.81	2.08	20.16	2.24	21.51	2.41	24.12	2.78	26.73	3.17
	4	13.59	1.54	16.20	1.80	18.81	2.12	20.16	2.29	21.51	2.45	24.12	2.83	26.73	3.21
	6	13.59	1.56	16.20	1.84	18.81	2.16	20.16	2.34	21.51	2.50	24.12	2.87	26.73	3.27
	8	13.59	1.59	16.20	1.88	18.81	2.21	20.16	2.38	21.51	2.55	24.12	2.92	26.73	3.33
	10	13.59	1.61	16.20	1.92	18.81	2.26	20.16	2.44	21.51	2.61	24.12	2.98	26.73	3.36
	12	13.59	1.63	16.20	1.96	18.81	2.30	20.16	2.49	21.51	2.67	24.12	3.04	26.73	3.43
	14	13.59	1.66	16.20	1.99	18.81	2.34	20.16	2.53	21.51	2.72	24.12	3.10	26.73	3.49
	16	13.59	1.69	16.20	2.03	18.81	2.39	20.16	2.57	21.51	2.76	24.12	3.16	26.73	3.55
	18	13.59	1.72	16.20	2.07	18.81	2.44	20.16	2.63	21.51	2.82	24.12	3.22	26.73	3.63
	20	13.59	1.75	16.20	2.11	18.81	2.49	20.16	2.68	21.51	2.87	24.12	3.34	26.73	3.88
	21	13.59	1.77	16.20	2.12	18.81	2.51	20.16	2.71	21.51	2.94	24.12	3.46	26.73	4.02
	23	13.59	1.80	16.20	2.17	18.81	2.63	20.16	2.88	21.51	3.14	24.12	3.70	26.73	4.31
	25	13.59	1.85	16.20	2.30	18.81	2.81	20.16	3.08	21.51	3.36	24.12	3.97	26.73	4.62
	27	13.59	1.97	16.20	2.45	18.81	2.99	20.16	3.29	21.51	3.59	24.12	4.24	26.73	4.94
	29	13.59	2.10	16.20	2.61	18.81	3.19	20.16	3.50	21.51	3.83	24.12	4.52	26.73	5.28
	31	13.59	2.22	16.20	2.78	18.81	3.40	20.16	3.73	21.51	4.09	24.12	4.83	26.28	5.49
	33	13.59	2.37	16.20	2.95	18.81	3.62	20.16	3.97	21.51	4.35	24.12	5.15	25.92	5.69
	35	13.59	2.51	16.20	3.14	18.81	3.85	20.16	4.23	21.51	4.63	24.12	5.49	25.47	5.90
	37	13.59	2.66	16.20	3.33	18.81	4.09	20.16	4.50	21.51	4.93	24.12	5.85	25.11	6.10
	39	13.59	2.82	16.20	3.55	18.81	4.35	20.16	4.79	21.51	5.25	24.12	6.23	24.66	6.32
	41	13.59	2.88	16.20	3.59	18.81	4.42	20.16	4.92	21.51	5.34	24.12	6.39	24.51	6.43
	43	13.59	2.97	16.20	3.62	18.81	4.48	20.16	5.00	21.51	5.42	24.12	6.46	24.36	6.50
	45	13.59	3.05	16.20	3.66	18.81	4.57	20.16	5.11	21.51	5.51	24.12	6.53	24.05	6.60
	48	13.59	2.00	16.20	2.39	21.16	3.01	20.16	3.40	21.51	3.63	24.12	4.28	26.83	4.38
70%	-5	11.88	1.28	14.22	1.50	16.47	1.70	17.64	1.83	18.81	1.95	21.06	2.23	23.40	2.57
	-2	11.88	1.29	14.22	1.51	16.47	1.72	17.64	1.86	18.81	1.99	21.06	2.27	23.40	2.60
	0	11.88	1.30	14.22	1.53	16.47	1.75	17.64	1.90	18.81	2.02	21.06	2.31	23.40	2.64
	2	11.88	1.31	14.22	1.54	16.47	1.78	17.64	1.93	18.81	2.06	21.06	2.36	23.40	2.68
	4	11.88	1.33	14.22	1.58	16.47	1.82	17.64	1.97	18.81	2.10	21.06	2.40	23.40	2.74
	6	11.88	1.35	14.22	1.61	16.47	1.86	17.64	2.03	18.81	2.15	21.06	2.44	23.40	2.79
	8	11.88	1.37	14.22	1.65	16.47	1.91	17.64	2.06	18.81	2.20	21.06	2.51	23.40	2.85
	10	11.88	1.40	14.22	1.68	16.47	1.96	17.64	2.11	18.81	2.26	21.06	2.56	23.40	2.88
	12	11.88	1.43	14.22	1.70	16.47	2.00	17.64	2.15	18.81	2.30	21.06	2.61	23.40	2.94
	14	11.88	1.46	14.22	1.73	16.47	2.03	17.64	2.18	18.81	2.34	21.06	2.66	23.40	2.99
	16	11.88	1.48	14.22	1.77	16.47	2.07	17.64	2.22	18.81	2.38	21.06	2.71	23.40	3.05
	18	11.88	1.50	14.22	1.80	16.47	2.11	17.64	2.26	18.81	2.42	21.06	2.76	23.40	3.11
	20	11.88	1.53	14.22	1.83	16.47	2.15	17.64	2.30	18.81	2.47	21.06	2.82	23.40	3.20
	21	11.88	1.54	14.22	1.84	16.47	2.16	17.64	2.33	18.81	2.49	21.06	2.86	23.40	3.31
	23	11.88	1.57	14.22	1.88	16.47	2.21	17.64	2.41	18.81	2.62	21.06	3.06	23.40	3.55
	25	11.88	1.60	14.22	1.96	16.47	2.35	17.64	2.57	18.81	2.79	21.06	3.28	23.40	3.79
	27	11.88	1.69	14.22	2.08	16.47	2.51	17.64	2.74	18.81	2.98	21.06	3.50	23.40	4.05
	29	11.88	1.80	14.22	2.21	16.47	2.67	17.64	2.92	18.81	3.17	21.06	3.73	23.40	4.33
	31	11.88	1.90	14.22	2.34	16.47	2.84	17.64	3.10	18.81	3.38	21.06	3.97	23.40	4.62
	33	11.88	2.02	14.22	2.49	16.47	3.02	17.64	3.30	18.81	3.60	21.06	4.24	23.40	4.92
	35	11.88	2.14	14.22	2.64	16.47	3.21	17.64	3.52	18.81	3.83	21.06	4.51	23.40	5.25
	37	11.88	2.26	14.22	2.80	16.47	3.41	17.64	3.73	18.81	4.08	21.06	4.81	23.40	5.59
	39	11.88	2.39	14.22	2.97	16.47	3.62	17.64	3.97	18.81	4.33	21.06	5.11	23.40	5.95

	41	11.88	2.50	14.22	3.07	16.47	3.72	17.64	4.10	18.81	4.46	21.06	5.32	23.40	6.22
	43	11.88	2.70	14.22	3.29	16.47	3.88	17.64	4.32	18.81	4.59	21.06	5.51	23.40	6.41
	45	11.88	2.76	14.22	3.36	16.47	3.96	17.64	4.39	18.81	4.82	21.06	5.81	23.40	6.66
	48	11.88	5.18	14.22	6.28	16.47	7.41	17.64	8.10	18.81	8.75	21.06	10.55	23.40	11.98
60%	-5	10.17	1.09	12.15	1.27	14.13	1.48	15.12	1.58	16.11	1.70	18.09	1.91	20.07	2.19
	-2	10.17	1.10	12.15	1.29	14.13	1.51	15.12	1.60	16.11	1.72	18.09	1.94	20.07	2.21
	0	10.17	1.12	12.15	1.31	14.13	1.53	15.12	1.62	16.11	1.75	18.09	1.97	20.07	2.23
	2	10.17	1.14	12.15	1.34	14.13	1.55	15.12	1.65	16.11	1.77	18.09	2.01	20.07	2.26
	4	10.17	1.17	12.15	1.36	14.13	1.58	15.12	1.67	16.11	1.80	18.09	2.04	20.07	2.30
	6	10.17	1.18	12.15	1.39	14.13	1.61	15.12	1.71	16.11	1.83	18.09	2.08	20.07	2.35
	8	10.17	1.20	12.15	1.41	14.13	1.64	15.12	1.74	16.11	1.87	18.09	2.12	20.07	2.39
	10	10.17	1.23	12.15	1.44	14.13	1.67	15.12	1.79	16.11	1.91	18.09	2.16	20.07	2.42
	12	10.17	1.25	12.15	1.46	14.13	1.70	15.12	1.82	16.11	1.94	18.09	2.20	20.07	2.46
	14	10.17	1.27	12.15	1.49	14.13	1.73	15.12	1.85	16.11	1.98	18.09	2.24	20.07	2.51
	16	10.17	1.28	12.15	1.51	14.13	1.76	15.12	1.88	16.11	2.01	18.09	2.28	20.07	2.56
	18	10.17	1.31	12.15	1.54	14.13	1.79	15.12	1.92	16.11	2.05	18.09	2.32	20.07	2.60
	20	10.17	1.32	12.15	1.57	14.13	1.82	15.12	1.96	16.11	2.09	18.09	2.37	20.07	2.66
	21	10.17	1.34	12.15	1.58	14.13	1.84	15.12	1.97	16.11	2.11	18.09	2.39	20.07	2.68
	23	10.17	1.35	12.15	1.61	14.13	1.87	15.12	2.01	16.11	2.14	18.09	2.49	20.07	2.86
	25	10.17	1.38	12.15	1.63	14.13	1.94	15.12	2.11	16.11	2.28	18.09	2.65	20.07	3.05
	27	10.17	1.43	12.15	1.73	14.13	2.07	15.12	2.25	16.11	2.43	18.09	2.83	20.07	3.25
	29	10.17	1.51	12.15	1.84	14.13	2.20	15.12	2.39	16.11	2.59	18.09	3.02	20.07	3.47
	31	10.17	1.61	12.15	1.95	14.13	2.33	15.12	2.54	16.11	2.75	18.09	3.21	20.07	3.70
	33	10.17	1.69	12.15	2.07	14.13	2.48	15.12	2.70	16.11	2.93	18.09	3.41	20.07	3.94
	35	10.17	1.80	12.15	2.19	14.13	2.63	15.12	2.87	16.11	3.11	18.09	3.63	20.07	4.20
	37	10.17	1.90	12.15	2.32	14.13	2.79	15.12	3.04	16.11	3.30	18.09	3.86	20.07	4.46
	39	10.17	2.00	12.15	2.45	14.13	2.95	15.12	3.22	16.11	3.51	18.09	4.10	20.07	4.75
	41	10.17	2.07	12.15	2.56	14.13	3.06	15.12	3.35	16.11	3.64	18.09	4.29	20.07	4.96
	43	10.17	2.13	12.15	2.67	14.13	3.17	15.12	3.45	16.11	3.76	18.09	4.48	20.07	5.18
	45	10.17	2.23	12.15	2.80	14.13	3.30	15.12	3.58	16.11	3.95	18.09	4.68	20.07	5.47
	48	10.17	3.13	12.15	3.89	14.13	4.51	15.12	4.94	16.11	5.54	18.09	6.41	20.07	7.67
50%	-5	8.51	0.95	10.17	1.10	11.79	1.26	12.60	1.32	13.41	1.40	15.03	1.59	16.74	1.71
	-2	8.51	0.96	10.17	1.12	11.79	1.28	12.60	1.34	13.41	1.42	15.03	1.61	16.74	1.73
	0	8.51	0.97	10.17	1.14	11.79	1.30	12.60	1.36	13.41	1.44	15.03	1.63	16.74	1.76
	2	8.51	0.99	10.17	1.15	11.79	1.32	12.60	1.38	13.41	1.46	15.03	1.64	16.74	1.80
	4	8.51	1.00	10.17	1.17	11.79	1.34	12.60	1.40	13.41	1.49	15.03	1.68	16.74	1.84
	6	8.51	1.02	10.17	1.19	11.79	1.36	12.60	1.43	13.41	1.52	15.03	1.71	16.74	1.90
	8	8.51	1.04	10.17	1.21	11.79	1.38	12.60	1.46	13.41	1.54	15.03	1.74	16.74	1.96
	10	8.51	1.06	10.17	1.23	11.79	1.40	12.60	1.48	13.41	1.58	15.03	1.78	16.74	1.99
	12	8.51	1.07	10.17	1.24	11.79	1.42	12.60	1.51	13.41	1.61	15.03	1.81	16.74	2.02
	14	8.51	1.08	10.17	1.26	11.79	1.44	12.60	1.54	13.41	1.64	15.03	1.84	16.74	2.06
	16	8.51	1.10	10.17	1.27	11.79	1.46	12.60	1.57	13.41	1.66	15.03	1.88	16.74	2.09
	18	8.51	1.12	10.17	1.30	11.79	1.49	12.60	1.59	13.41	1.69	15.03	1.91	16.74	2.13
	20	8.51	1.13	10.17	1.31	11.79	1.51	12.60	1.61	13.41	1.73	15.03	1.94	16.74	2.17
	21	8.51	1.14	10.17	1.33	11.79	1.53	12.60	1.63	13.41	1.74	15.03	1.96	16.74	2.19
	23	8.51	1.16	10.17	1.35	11.79	1.55	12.60	1.66	13.41	1.77	15.03	1.99	16.74	2.24
	25	8.51	1.17	10.17	1.37	11.79	1.58	12.60	1.69	13.41	1.83	15.03	2.10	16.74	2.39
	27	8.51	1.20	10.17	1.42	11.79	1.67	12.60	1.80	13.41	1.94	15.03	2.23	16.74	2.55
	29	8.51	1.26	10.17	1.50	11.79	1.77	12.60	1.92	13.41	2.07	15.03	2.37	16.74	2.72
	31	8.51	1.33	10.17	1.59	11.79	1.88	12.60	2.03	13.41	2.19	15.03	2.52	16.74	2.89
	33	8.51	1.41	10.17	1.69	11.79	1.99	12.60	2.15	13.41	2.33	15.03	2.68	16.74	3.07
	35	8.51	1.49	10.17	1.78	11.79	2.11	12.60	2.28	13.41	2.46	15.03	2.85	16.74	3.26
	37	8.51	1.57	10.17	1.88	11.79	2.23	12.60	2.41	13.41	2.61	15.03	3.02	16.74	3.47
	39	8.51	1.65	10.17	1.99	11.79	2.36	12.60	2.56	13.41	2.77	15.03	3.21	16.74	3.68
	41	8.51	1.72	10.17	2.07	11.79	2.44	12.60	2.68	13.41	2.89	15.03	3.38	16.74	3.85
	43	8.51	1.84	10.17	2.21	11.79	2.53	12.60	2.80	13.41	2.96	15.03	3.55	16.74	4.02
	45	8.51	1.88	10.17	2.27	11.79	2.70	12.60	3.01	13.41	3.09	15.03	3.89	16.74	4.36
	48	8.51	1.99	10.17	2.43	11.79	2.80	12.60	3.13	13.41	3.16	15.03	4.09	16.74	4.56

8HP heating mode

Combination (Capacity index)	Outdoor air temp.		Indoor temperature(°C DB)											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-19.8	-20	17.48	4.34	17.40	4.65	17.32	4.96	17.32	5.11	17.23	5.26	17.23	5.57
	-18.8	-19	17.74	4.44	17.66	4.74	17.66	5.05	17.57	5.20	17.57	5.34	17.48	5.65
	-16.7	-17	18.43	4.65	18.34	4.94	18.26	5.23	18.26	5.37	18.26	5.52	18.17	5.81
	-13.7	-15	19.20	4.86	19.12	5.14	19.03	5.42	19.03	5.56	18.94	5.70	18.94	5.98
	-11.8	-13	19.97	5.08	19.97	5.35	19.89	5.61	19.80	5.75	19.80	5.89	19.71	6.15
	-9.8	-11	20.92	5.30	20.83	5.56	20.74	5.81	20.74	5.94	20.74	6.07	20.66	6.33
	-9.5	-10	21.43	5.42	21.34	5.66	21.26	5.91	21.26	6.04	21.17	6.16	21.17	6.41
	-8.5	-9.1	21.86	5.51	21.77	5.75	21.77	6.00	21.69	6.12	21.69	6.24	21.60	6.49
	-7	-7.6	22.63	5.67	22.63	5.91	22.54	6.14	22.54	6.26	22.46	6.37	22.37	6.61
	-5	-5.6	23.83	5.89	23.74	6.11	23.66	6.33	23.66	6.45	23.57	6.55	23.57	6.77
	-3	-3.7	24.94	6.08	24.86	6.29	24.86	6.50	24.77	6.61	24.77	6.72	24.68	6.92
	0	-0.7	26.91	6.37	26.91	6.57	26.83	6.76	26.83	6.84	26.74	6.96	26.74	7.16
	3	2.2	29.05	6.64	28.97	6.82	28.89	7.00	28.89	7.09	28.89	7.19	28.80	7.36
	5	4.1	30.51	6.80	30.43	6.98	30.43	7.15	30.34	7.24	30.34	7.32	30.26	7.49
	7	6	32.06	6.97	31.97	7.12	31.97	7.29	31.88	7.37	31.88	7.45	30.60	7.16
	9	7.9	33.68	7.11	33.60	7.27	33.60	7.42	33.51	7.50	32.83	7.34	30.60	6.72
	11	9.8	35.40	7.25	35.31	7.40	35.14	7.49	33.94	7.20	32.83	6.90	30.60	6.33
	13	11.8	37.28	7.39	37.20	7.53	35.14	7.02	33.94	6.74	32.83	6.48	30.60	5.94
	15	13.7	39.08	7.52	37.37	7.13	35.14	6.61	33.94	6.36	32.83	6.10	30.60	5.61
120%	-19.8	-20	17.40	4.76	17.31	5.04	17.23	5.33	17.23	5.46	17.23	5.61	17.14	5.89
	-18.8	-19	17.66	4.85	17.57	5.13	17.57	5.41	17.49	5.54	17.49	5.69	17.40	5.97
	-16.7	-17	18.34	5.04	18.26	5.31	18.14	5.57	18.17	5.71	18.17	5.85	18.09	6.11
	-13.7	-15	19.12	5.24	19.03	5.50	18.94	5.75	18.94	5.89	18.94	6.01	18.86	6.27
	-11.8	-13	19.89	5.44	19.89	5.69	19.80	5.93	19.80	6.06	19.72	6.18	19.72	6.43
	-9.8	-11	20.83	5.65	20.74	5.88	20.74	6.12	20.66	6.24	20.66	6.35	20.57	6.59
	-9.5	-10	21.35	5.75	21.26	5.98	21.17	6.21	21.17	6.33	21.17	6.44	21.09	6.67
	-8.5	-9.1	21.77	5.84	21.69	6.06	21.69	6.29	21.60	6.40	21.60	6.52	21.51	6.74
	-7	-7.6	22.54	5.99	22.54	6.21	22.46	6.42	22.46	6.53	22.37	6.64	22.37	6.85
	-5	-5.6	23.74	6.18	23.66	6.39	23.57	6.60	23.57	6.70	23.57	6.81	23.49	7.00
	-3	-3.7	24.86	6.37	24.86	6.57	24.77	6.76	24.77	6.85	24.69	6.96	24.69	7.15
	0	-0.7	26.83	6.64	26.83	6.82	26.74	7.00	26.74	7.09	26.66	7.18	26.66	7.36
	3	2.2	28.97	6.89	28.89	7.05	28.89	7.22	28.80	7.31	28.80	7.39	28.20	7.35
	5	4.1	30.43	7.04	30.34	7.20	30.34	7.36	30.26	7.44	30.26	7.52	28.20	6.90
	7	6	31.97	7.18	31.97	7.33	31.89	7.48	31.37	7.38	30.34	7.08	28.20	6.49
	9	7.9	33.60	7.32	33.52	7.47	32.40	7.22	31.37	6.93	30.34	6.65	28.20	6.11
	11	9.8	35.31	7.45	34.46	7.32	32.40	6.79	31.37	6.53	30.34	6.26	28.20	5.76
	13	11.8	36.60	7.38	34.46	6.87	32.40	6.37	31.37	6.13	30.34	5.89	28.20	5.42
	15	13.7	36.60	6.95	34.46	6.47	32.40	6.01	31.37	5.77	30.34	5.55	28.20	5.11
110%	-19.8	-20	17.31	5.18	17.23	5.43	17.14	5.69	17.14	5.82	17.15	5.95	17.06	6.21
	-18.8	-19	17.57	5.26	17.49	5.51	17.49	5.77	17.49	5.89	17.40	6.02	17.40	6.28
	-16.7	-17	18.26	5.43	18.17	5.68	18.43	5.93	18.09	6.05	18.09	6.17	18.00	6.41
	-13.7	-15	19.03	5.62	18.95	5.85	18.86	6.09	18.86	6.21	18.86	6.33	18.77	6.56
	-11.8	-13	19.80	5.81	19.80	6.03	19.71	6.25	19.71	6.37	19.63	6.48	19.63	6.71
	-9.8	-11	20.74	5.99	20.66	6.21	20.66	6.42	20.57	6.53	20.57	6.64	20.57	6.85
	-9.5	-10	21.26	6.09	21.17	6.29	21.08	6.51	21.08	6.61	21.08	6.72	21.00	6.93
	-8.5	-9.1	21.69	6.17	21.60	6.37	21.60	6.58	21.51	6.69	21.51	6.79	21.51	6.19
	-7	-7.6	22.46	6.31	22.46	6.50	22.37	6.70	22.37	6.80	22.37	6.90	22.29	7.10
	-5	-5.6	23.66	6.49	23.57	6.68	23.49	6.86	23.49	6.96	23.49	7.05	23.40	7.25
	-3	-3.7	24.77	6.65	24.77	6.83	24.69	7.01	24.69	7.10	24.60	7.19	24.60	7.37
	0	-0.7	26.74	6.90	26.74	7.07	26.66	7.24	26.66	7.32	26.66	7.40	25.89	7.26
	3	2.2	28.89	7.13	28.80	7.28	28.80	7.44	28.71	7.51	27.77	7.20	25.89	6.61
	5	4.1	30.34	7.27	30.34	7.42	29.74	7.35	28.71	7.05	27.77	6.77	25.89	6.21
	7	6	31.88	7.40	31.63	7.45	29.74	6.90	28.71	6.63	27.77	6.37	25.89	5.85
	9	7.9	33.51	7.52	31.63	7.00	29.74	6.49	28.71	6.24	27.77	5.99	25.89	5.51
	11	9.8	33.51	7.08	31.63	6.59	29.74	6.11	28.71	5.88	27.77	5.65	25.89	5.20
	13	11.8	33.51	6.64	31.63	6.18	29.74	5.74	28.71	5.53	27.77	5.31	25.89	4.90
	15	13.7	33.51	5.89	31.63	5.83	29.74	5.42	28.71	5.22	27.77	5.02	25.89	4.63
100%	-19.8	-20	17.23	5.59	17.14	5.82	17.14	6.06	17.06	6.18	17.06	6.29	16.97	6.53
	-18.8	-19	17.49	5.66	17.49	5.89	17.40	6.13	17.40	6.25	17.32	6.37	17.32	6.60

	-16.7	-17	18.17	5.82	18.08	6.05	18.08	6.27	18.00	6.38	18.00	6.49	18.00	6.72
	-13.7	-15	18.94	5.99	18.86	6.21	18.77	6.42	18.77	6.53	18.77	6.64	18.69	6.85
	-11.8	-13	19.72	6.17	19.72	6.37	19.63	6.57	19.63	6.68	19.63	6.78	19.54	6.99
	-9.8	-11	20.66	6.33	20.57	6.53	20.57	6.73	20.57	6.83	20.48	6.92	20.48	7.12
	-9.5	-10	21.17	6.42	21.09	6.61	21.09	6.80	21.00	6.90	21.00	7.00	20.91	7.19
	-8.5	-9.1	21.60	6.49	21.51	6.69	21.51	6.87	21.51	6.96	21.43	7.06	21.43	7.24
	-7	-7.6	22.37	6.62	22.37	6.80	22.29	6.98	22.29	7.08	22.29	7.16	22.20	7.35
	-5	-5.6	23.57	6.79	23.48	6.96	23.48	7.13	23.40	7.21	23.40	7.30	23.31	7.48
	-3	-3.7	24.69	6.94	24.69	6.30	24.60	7.27	24.60	7.35	24.60	7.43	23.57	7.12
	0	-0.7	26.66	7.16	26.66	7.32	26.57	7.47	26.14	7.35	25.29	7.04	23.57	6.46
	3	2.2	28.80	7.37	28.71	7.51	27.00	6.95	26.14	6.68	25.29	6.41	23.57	5.89
	5	4.1	30.26	7.51	28.71	7.05	27.00	6.53	26.14	6.29	25.29	6.04	23.57	5.55
	7	6	30.43	7.12	28.71	6.63	27.00	6.15	26.14	5.92	25.29	5.69	23.57	5.23
	9	7.9	30.43	6.69	28.71	6.24	27.00	5.79	26.14	5.50	25.29	5.36	23.57	4.94
	11	9.8	30.43	6.30	28.71	5.88	27.00	5.46	26.14	5.26	25.29	5.06	23.57	4.66
	13	11.8	30.43	5.92	28.71	5.53	27.00	5.14	26.14	4.95	25.29	4.77	23.57	4.40
	15	13.7	30.43	5.58	28.71	5.22	27.00	4.86	26.14	4.68	25.29	4.50	23.57	4.17
90%	-19.8	-20	17.11	6.01	17.03	6.21	17.03	6.43	16.94	6.53	16.94	6.64	16.94	6.85
	-18.8	-19	17.37	6.07	17.37	6.29	17.28	6.49	17.28	6.60	17.28	6.70	17.20	6.91
	-16.7	-17	18.05	6.22	17.97	6.42	17.97	6.62	17.97	6.72	17.88	6.82	17.88	7.02
	-13.7	-15	18.82	6.37	18.74	6.57	18.74	6.76	18.65	6.85	18.65	6.95	18.65	7.14
	-11.8	-13	19.59	6.53	19.59	6.71	19.51	6.89	19.51	6.99	19.51	7.08	19.42	7.26
	-9.8	-11	20.54	6.68	20.54	6.85	20.45	7.03	20.45	7.12	20.45	7.21	20.36	7.39
	-9.5	-10	21.05	6.76	20.96	6.93	20.96	7.10	20.88	7.19	20.88	7.28	20.88	7.44
	-8.5	-9.1	21.48	6.83	21.48	7.00	21.39	7.16	21.39	7.24	21.39	7.33	21.13	7.40
	-7	-7.6	22.25	6.94	22.25	7.10	22.16	7.27	22.16	7.35	22.16	7.43	21.13	7.07
	-5	-5.6	23.44	7.09	23.36	7.24	23.36	7.40	23.27	7.48	22.67	7.24	21.13	6.64
	-3	-3.7	24.56	7.23	24.56	7.37	24.30	7.40	23.44	7.11	22.67	6.82	21.13	6.26
	0	-0.7	26.61	7.44	25.84	7.25	24.30	6.72	23.44	6.45	22.67	6.20	21.13	5.69
	3	2.2	27.38	7.08	25.84	6.60	24.30	6.12	23.44	5.89	22.67	5.65	21.13	5.21
	5	4.1	27.38	6.66	25.84	6.21	24.30	5.77	23.44	5.54	22.67	5.34	21.13	4.91
	7	6	27.38	6.26	25.84	5.85	24.30	5.43	23.44	5.23	22.67	5.03	21.13	4.64
	9	7.9	27.38	5.90	25.84	5.50	24.30	5.12	23.44	4.94	22.67	4.75	21.13	4.39
	11	9.8	27.38	5.56	25.84	5.19	24.30	4.84	23.44	4.66	22.67	4.49	21.13	4.15
	13	11.8	27.38	5.23	25.84	4.90	24.30	4.56	23.44	4.40	22.67	4.24	21.13	3.92
	15	13.7	27.38	4.94	25.84	4.62	24.30	4.32	23.44	4.17	22.67	4.02	21.13	3.72
80%	-19.8	-20	17.06	6.42	16.97	6.61	16.97	6.80	16.97	6.89	16.88	6.99	16.88	7.17
	-18.8	-19	17.31	6.48	17.31	6.67	17.23	6.85	17.23	6.95	17.23	7.04	17.14	7.23
	-16.7	-17	18.00	6.61	17.92	6.79	17.92	6.97	17.92	7.06	17.92	7.15	17.83	7.32
	-13.7	-15	18.77	6.75	18.69	6.92	18.69	7.09	18.69	7.17	18.60	7.26	18.60	7.44
	-11.8	-13	19.54	6.88	19.54	7.05	19.46	7.21	19.46	7.29	19.46	7.38	18.86	7.18
	-9.8	-11	20.49	7.02	20.49	7.18	20.40	7.34	20.40	7.41	20.23	7.40	18.86	6.78
	-9.5	-10	21.00	7.09	20.91	7.24	20.92	7.40	20.92	7.48	20.23	7.18	18.86	6.58
	-8.5	-9.1	21.43	7.16	19.92	7.31	21.34	7.45	20.92	7.28	20.23	6.99	18.86	6.41
	-7	-7.6	22.20	7.26	22.20	7.40	21.60	7.24	20.92	6.96	20.23	6.68	18.86	6.13
	-5	-5.6	23.40	7.39	22.97	7.35	21.60	6.80	20.92	6.54	20.23	6.28	18.86	5.77
	-3	-3.7	24.34	7.43	22.97	6.92	21.60	6.41	20.92	6.17	20.23	5.92	18.86	5.45
	0	-0.7	24.34	6.74	22.97	6.28	21.60	5.83	20.92	5.61	20.23	5.39	18.86	4.97
	3	2.2	24.34	6.14	22.97	5.73	21.60	5.33	20.92	5.13	20.23	4.94	18.86	4.55
	5	4.1	24.34	5.78	22.97	5.40	21.60	5.02	20.92	4.84	20.23	4.66	18.86	4.30
	7	6	24.34	5.45	22.97	5.10	21.60	4.74	20.92	4.58	20.23	4.41	18.86	4.07
	9	7.9	24.34	5.14	22.97	4.81	21.60	4.48	20.92	4.32	20.23	4.17	18.86	3.86
	11	9.8	24.34	4.86	22.97	4.54	21.60	4.24	20.92	4.09	20.23	3.95	18.86	3.66
	13	11.8	24.34	4.58	22.97	4.29	21.60	4.01	20.92	3.87	20.23	3.73	18.86	3.46
	15	13.7	24.34	4.33	22.97	4.07	21.60	3.80	20.92	3.67	20.23	3.54	18.86	3.29
70%	-19.8	-20	16.93	6.84	16.85	7.00	16.85	7.16	16.85	7.24	16.85	7.33	16.42	7.25
	-18.8	-19	17.19	6.89	17.19	7.05	17.10	7.21	17.10	7.29	17.10	7.38	16.42	7.10
	-16.7	-17	17.87	7.00	17.87	7.16	17.79	7.32	17.79	7.40	17.62	6.59	16.42	6.77
	-13.7	-15	18.64	7.12	18.56	7.28	18.56	7.43	18.22	7.32	17.62	7.02	16.42	6.44
	-11.8	-13	19.41	7.24	19.41	7.39	18.90	7.21	18.22	6.93	17.62	6.65	16.42	6.10
	-9.8	-11	20.35	7.36	20.10	7.36	18.90	6.81	18.22	6.55	17.62	6.29	16.42	5.77
	-9.5	-10	20.87	7.43	20.10	7.14	18.90	6.61	18.22	6.36	17.62	6.11	16.42	5.61
	-8.5	-9.1	21.29	7.47	20.10	6.95	18.90	6.44	18.22	6.19	17.62	5.95	16.42	5.47
	-7	-7.6	21.29	7.13	20.10	6.64	18.90	6.16	18.22	5.93	17.62	5.69	16.42	5.24

	-5	-5.6	21.29	6.70	20.10	6.25	18.90	5.80	18.22	5.57	17.62	6.59	16.42	4.94
	-3	-3.7	21.29	6.31	20.10	5.89	18.90	5.47	18.22	5.26	17.62	5.06	16.42	4.67
	0	-0.7	21.29	5.74	20.10	5.37	18.90	4.99	18.22	4.81	17.62	4.63	16.42	4.28
	3	2.2	21.29	5.25	20.10	4.91	18.90	4.58	18.22	4.41	17.62	4.25	16.42	3.93
	5	4.1	21.29	4.95	20.10	4.63	18.90	4.33	18.22	4.17	17.62	4.02	16.42	3.72
	7	6	21.29	4.68	20.10	4.38	18.90	4.09	18.22	3.95	17.62	3.81	16.42	3.53
	9	7.9	21.29	4.42	20.10	4.15	18.90	3.87	18.22	3.74	17.62	3.61	16.42	3.35
	11	9.8	21.29	4.18	20.10	3.92	18.90	3.67	18.22	3.55	17.62	3.43	16.42	3.18
	13	11.8	21.29	3.95	20.10	3.71	18.90	3.47	18.22	3.36	17.62	3.24	16.42	3.02
	15	13.7	21.29	3.75	20.10	3.52	18.90	3.30	18.22	3.19	17.62	3.08	16.42	2.88
60%	-19.8	-20	16.89	7.25	16.80	7.39	16.20	7.11	15.69	6.83	15.17	6.56	14.14	6.01
	-18.8	-19	17.14	7.30	17.14	7.44	16.20	6.96	15.69	6.68	15.17	6.41	14.14	5.89
	-16.7	-17	17.83	7.40	17.23	7.16	16.20	6.64	15.69	6.38	15.17	6.13	14.14	5.63
	-13.7	-15	18.26	7.32	17.23	6.80	16.20	6.31	15.69	6.07	15.17	5.83	14.14	5.36
	-11.8	-13	18.26	6.92	17.23	6.44	16.20	5.98	15.69	5.76	15.17	5.53	14.14	5.12
	-9.8	-11	18.26	6.54	17.23	6.09	16.20	5.66	15.69	5.45	15.17	5.24	14.14	4.83
	-9.5	-10	18.26	6.36	17.23	5.93	16.20	5.50	15.69	5.30	15.17	5.10	14.14	4.70
	-8.5	-9.1	18.26	6.19	17.23	5.77	16.20	5.37	15.69	5.17	15.17	4.97	14.14	4.58
	-7	-7.6	18.26	5.92	17.23	5.53	16.20	5.14	15.69	4.95	15.17	4.76	14.14	4.40
	-5	-5.6	18.26	5.57	17.23	5.21	16.20	4.85	15.69	4.67	15.17	4.50	14.14	4.16
	-3	-3.7	18.26	5.26	17.23	4.92	16.20	4.58	15.69	4.42	15.17	4.26	14.14	3.94
	0	-0.7	18.26	4.81	17.23	4.50	16.20	4.20	15.69	4.06	15.17	3.91	14.14	3.62
	3	2.2	18.26	4.41	17.23	4.14	16.20	3.87	15.69	3.73	15.17	3.60	14.14	3.34
	5	4.1	18.26	4.17	17.23	3.91	16.20	3.66	15.69	3.54	15.17	3.41	14.14	3.17
	7	6	18.26	3.95	17.23	3.71	16.20	3.47	15.69	3.35	15.17	3.24	14.14	3.01
	9	7.9	18.26	3.74	17.23	3.51	16.20	3.29	15.69	3.19	15.17	3.07	14.14	2.87
	11	9.8	18.26	3.55	17.23	3.34	16.20	3.13	15.69	3.03	15.17	2.92	14.14	2.73
	13	11.8	18.26	3.35	17.23	3.16	16.20	2.97	15.69	2.88	15.17	2.78	14.14	2.60
	15	13.7	18.26	3.19	17.23	3.00	16.20	2.83	15.69	2.74	15.17	2.65	14.14	2.48
50%	-19.8	-20	15.21	6.60	14.35	6.14	13.50	5.70	12.99	5.49	12.56	5.28	11.71	4.86
	-18.8	-19	15.21	6.45	14.35	6.01	13.50	5.59	12.99	5.38	12.56	5.17	11.71	4.77
	-16.7	-17	15.21	6.16	14.35	5.74	13.50	5.34	12.99	5.14	12.56	4.95	11.71	4.57
	-13.7	-15	15.21	5.86	14.35	5.47	13.50	5.09	12.99	4.90	12.56	4.72	11.71	4.36
	-11.8	-13	15.21	5.57	14.35	5.20	13.50	4.84	12.99	4.66	12.56	4.49	11.71	4.15
	-9.8	-11	15.21	5.27	14.35	4.93	13.50	4.59	12.99	4.42	12.56	4.26	11.71	3.95
	-9.5	-10	15.21	5.13	14.35	4.79	13.50	4.47	12.99	4.31	12.56	4.15	11.71	3.84
	-8.5	-9.1	15.21	5.00	14.35	4.68	13.50	4.36	12.99	4.21	12.56	4.06	11.71	3.75
	-7	-7.6	15.21	4.79	14.35	4.49	13.50	4.18	12.99	4.04	12.56	3.90	11.71	3.61
	-5	-5.6	15.21	4.52	14.35	4.24	13.50	3.96	12.99	3.83	12.56	3.69	11.71	3.42
	-3	-3.7	15.21	4.28	14.35	4.02	13.50	3.75	12.99	3.63	12.56	3.50	11.71	3.25
	0	-0.7	15.21	3.93	14.35	3.69	13.50	3.46	12.99	3.34	12.56	3.23	11.71	3.00
	3	2.2	15.21	3.62	14.35	3.40	13.50	3.19	12.99	3.08	12.56	2.98	11.71	2.78
	5	4.1	15.21	3.43	14.35	3.23	13.50	3.03	12.99	2.93	12.56	2.84	11.71	2.64
	7	6	15.21	3.26	14.35	3.07	13.50	2.88	12.99	2.79	12.56	2.70	11.71	2.52
	9	7.9	15.21	3.09	14.35	2.92	13.50	2.74	12.99	2.66	12.56	2.57	11.71	2.40
	11	9.8	15.21	2.94	14.35	2.77	13.50	2.61	12.99	2.53	12.56	2.45	11.71	2.29
	13	11.8	15.21	2.80	14.35	2.64	13.50	2.48	12.99	2.41	12.56	2.33	11.71	2.19
	15	13.7	15.21	2.66	14.35	2.52	13.50	2.37	12.99	2.30	12.56	2.23	11.71	2.09

Note:

1,  is shown as reference

2, In cooling mode, avoid the outdoor air temperature range from 42-48 degree C, when selecting the models

In heating mode, avoid the outdoor air temperature range from -15 to -20 degree C, when selecting the models

3, The above table shows the average value of conditions may operate

4, It is recommended to connect less than 130%

10HP cooling mode

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(° C DB/WD)													
		DB:20.8,WB:14		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
130%	-5	24.60	2.94	29.30	3.59	34.00	3.85	35.30	4.01	37.00	4.12	37.90	4.48	38.85	4.51
	-2	24.60	2.94	29.30	3.66	34.00	3.85	35.30	4.03	37.00	4.12	37.90	4.54	38.85	4.55
	0	24.60	2.99	29.30	3.73	34.00	3.99	35.30	4.25	37.00	4.36	37.90	4.59	38.85	4.62
	2	24.60	3.05	29.30	3.73	34.00	4.13	35.30	4.49	37.00	4.41	37.90	4.63	38.85	4.68
	4	24.60	3.12	29.30	3.81	34.00	4.27	35.30	4.51	37.00	4.47	37.90	4.62	38.85	4.77
	6	24.60	3.18	29.30	3.88	34.00	4.43	35.30	4.55	36.58	4.61	37.43	4.62	38.43	4.81
	8	24.60	3.25	29.30	3.97	34.00	4.65	35.30	4.77	36.13	4.76	37.03	3.90	37.93	4.86
	10	24.60	3.32	29.30	4.06	34.00	4.82	35.30	4.93	35.70	4.04	36.60	4.06	37.50	5.00
	12	24.60	3.38	29.30	4.13	34.00	4.92	34.80	4.03	35.30	4.06	36.10	4.07	37.00	5.03
	14	24.60	3.45	29.30	4.21	33.90	4.05	34.40	4.06	34.80	4.08	35.70	4.09	36.60	5.14
	16	24.60	3.50	29.30	4.30	33.50	4.06	33.90	4.08	34.30	4.10	35.20	4.12	36.10	5.22
	18	24.60	3.57	29.30	4.39	33.00	5.14	33.40	5.17	33.90	5.20	34.80	5.25	35.70	5.30
	20	24.60	3.65	29.30	4.67	32.50	5.40	33.00	5.42	33.40	5.45	34.30	5.50	35.20	5.56
	21	24.60	3.75	29.30	4.83	32.30	5.52	32.80	5.55	33.20	5.58	34.10	5.64	35.00	5.69
	23	24.60	4.02	29.30	5.18	31.90	5.77	32.30	5.80	32.70	5.83	33.60	5.89	34.50	5.95
	25	24.60	4.29	29.30	5.55	31.40	6.03	31.80	6.06	32.30	6.09	33.20	6.15	34.10	6.21
	27	24.60	4.58	29.30	5.94	31.00	6.28	31.40	6.32	31.80	6.35	32.70	6.41	33.60	6.48
	29	24.60	4.89	29.30	6.35	30.50	6.53	30.90	6.57	31.40	6.61	32.30	6.68	33.20	6.74
	31	24.60	5.22	29.20	6.72	30.00	6.79	30.50	6.83	30.90	6.86	31.80	6.94	32.70	7.02
	33	24.60	5.56	28.70	6.97	29.60	7.04	30.00	7.08	30.50	7.12	31.40	7.20	32.20	7.28
	35	24.60	5.93	28.20	7.22	29.10	7.31	29.60	7.35	30.00	7.39	30.90	7.47	31.80	7.55
	37	24.60	6.31	27.80	7.48	28.70	7.57	29.10	7.61	29.60	7.66	30.40	7.74	31.30	7.83
	39	24.60	6.72	27.30	7.56	28.20	7.82	28.70	7.87	29.10	7.92	30.00	8.01	30.90	8.10
	41	24.60	7.07	27.02	7.63	27.90	7.89	28.40	7.94	28.80	7.99	29.70	8.02	29.71	8.18
	43	24.60	7.25	26.82	7.67	27.75	7.92	28.26	7.98	28.51	8.00	29.16	8.04	29.36	8.19
	45	24.60	7.61	26.65	7.74	27.46	7.99	27.96	8.03	28.09	8.04	28.37	8.07	28.78	8.35
	48	24.60	6.16	27.60	5.93	29.94	6.15	30.49	6.10	30.74	6.13	30.60	6.13	31.16	6.62
120%	-5	22.70	2.84	27.00	3.44	31.40	4.07	33.60	4.44	35.20	4.63	36.00	4.78	36.80	4.90
	-2	22.70	2.87	27.00	3.48	31.40	4.11	33.60	4.47	35.20	4.68	36.00	4.82	36.80	4.92
	0	22.70	2.90	27.00	3.50	31.40	4.16	33.60	4.48	35.20	4.72	36.00	4.85	36.80	4.93
	2	22.70	2.90	27.00	3.54	31.40	4.19	33.60	4.52	35.20	4.74	36.00	4.88	36.80	4.94
	4	22.70	2.93	27.00	3.58	31.40	4.25	33.60	4.56	35.20	4.81	36.00	4.89	36.80	4.95
	6	22.70	2.96	27.00	3.61	31.40	4.30	33.60	4.61	35.20	4.86	36.00	4.93	36.80	4.97
	8	22.70	2.99	27.00	3.65	31.40	4.36	33.60	4.67	35.20	4.91	36.00	4.95	36.80	4.99
	10	22.70	3.03	27.00	3.70	31.40	4.40	33.60	4.75	35.20	4.91	36.00	4.96	36.80	5.02
	12	22.70	3.09	27.00	3.77	31.40	4.48	33.60	4.84	34.70	4.93	35.50	4.93	36.30	5.05
	14	22.70	3.14	27.00	3.84	31.40	4.57	33.60	4.94	34.20	4.96	35.10	5.01	35.90	5.11
	16	22.70	3.20	27.00	3.92	31.40	4.66	33.40	4.10	33.80	5.04	34.60	5.09	35.40	5.19
	18	22.70	3.26	27.00	4.00	31.40	4.81	32.90	5.14	33.30	5.16	34.10	5.21	35.00	5.26
	20	22.70	3.33	27.00	4.15	31.40	5.18	32.50	5.40	32.90	5.41	33.70	5.46	34.50	5.51
	21	22.70	3.36	27.00	4.30	31.40	5.37	32.20	5.52	32.60	5.54	33.50	5.59	34.30	5.65
	23	22.70	3.59	27.00	4.61	31.40	5.74	31.80	5.76	32.20	5.79	33.00	5.85	33.80	5.90
	25	22.70	3.83	27.00	4.93	30.90	6.00	31.30	6.02	31.70	6.05	32.60	6.10	33.40	6.16
	27	22.70	4.10	27.00	5.27	30.50	6.24	30.90	6.28	31.30	6.31	32.10	6.37	32.90	6.42
	29	22.70	4.37	27.00	5.63	30.00	6.49	30.40	6.53	30.80	6.56	31.60	6.63	32.50	6.69
	31	22.70	4.66	27.00	6.01	29.50	6.75	30.00	6.78	30.40	6.82	31.20	6.89	32.00	6.96
	33	22.70	4.96	27.00	6.40	29.10	7.01	29.50	7.04	29.90	7.07	30.70	7.15	31.50	7.22
	35	22.70	5.28	27.00	6.83	28.60	7.26	29.00	7.30	29.50	7.34	30.30	7.41	31.10	7.49
	37	22.70	5.62	27.00	7.28	28.20	7.52	28.60	7.56	29.00	7.60	29.80	7.68	30.60	7.76
	39	22.70	5.98	26.90	7.69	27.70	7.77	28.10	7.82	28.50	7.86	29.40	7.95	30.20	8.02
	41	22.70	6.14	26.68	7.74	27.48	7.83	27.88	7.88	28.28	7.91	29.18	7.97	29.33	8.08
	43	22.70	6.23	26.54	7.79	27.27	7.88	27.67	7.91	28.07	7.94	28.67	7.99	28.88	8.25
	45	22.70	6.31	26.39	7.87	27.00	7.95	27.38	7.98	27.82	8.00	28.09	8.02	28.59	8.43
	48	26.30	4.11	30.32	5.11	30.88	5.17	31.21	5.23	31.88	5.22	32.05	5.15	32.68	5.46
110%	-5	20.80	2.48	24.80	3.09	28.80	3.69	30.80	3.96	32.80	4.26	35.30	4.42	36.10	4.56
	-2	20.80	2.53	24.80	3.13	28.80	3.72	30.80	4.00	32.80	4.29	35.30	4.47	36.10	4.58
	0	20.80	2.56	24.80	3.15	28.80	3.75	30.80	4.02	32.80	4.34	35.30	4.51	36.10	4.64

	2	20.80	2.61	24.80	3.18	28.80	3.81	30.80	4.07	32.80	4.39	35.30	4.58	36.10	4.70
	4	20.80	2.66	24.80	3.21	28.80	3.84	30.80	4.12	32.80	4.45	35.30	4.64	36.10	4.74
	6	20.80	2.69	24.80	3.25	28.80	3.88	30.80	4.18	32.80	4.50	35.30	4.69	36.10	4.81
	8	20.80	2.71	24.80	3.30	28.80	3.92	30.80	4.23	32.80	4.55	35.30	4.72	36.10	4.86
	10	20.80	2.75	24.80	3.35	28.80	3.98	30.80	4.30	32.80	4.63	35.30	4.75	36.10	4.91
	12	20.80	2.80	24.80	3.42	28.80	4.06	30.80	4.39	32.80	4.72	34.90	4.82	35.60	4.97
	14	20.80	2.85	24.80	3.47	28.80	4.13	30.80	4.46	32.80	4.80	34.40	4.86	35.20	5.01
	16	20.80	2.90	24.80	3.54	28.80	4.21	30.80	4.55	32.80	4.90	34.00	4.92	34.70	5.06
	18	20.80	2.96	24.80	3.61	28.80	4.30	30.80	4.68	32.80	5.13	33.50	5.17	34.30	5.22
	20	20.80	3.02	24.80	3.69	28.80	4.55	30.80	5.03	32.30	5.39	33.10	5.42	33.80	5.47
	21	20.80	3.05	24.80	3.79	28.80	4.72	30.80	5.21	32.10	5.51	32.80	5.55	33.60	5.60
	23	20.80	3.19	24.80	4.07	28.80	5.06	30.80	5.59	31.60	5.75	32.40	5.81	33.10	5.86
	25	20.80	3.41	24.80	4.35	28.80	5.40	30.80	5.99	31.20	6.01	31.90	6.07	32.70	6.11
	27	20.80	3.63	24.80	4.65	28.80	5.78	30.30	6.24	30.70	6.26	31.50	6.32	32.20	6.38
	29	20.80	3.87	24.80	4.96	28.80	6.18	29.90	6.49	30.30	6.52	31.00	6.58	31.80	6.64
	31	20.80	4.12	24.80	5.29	28.80	6.60	29.40	6.74	29.80	6.77	30.60	6.83	31.30	6.90
	33	20.80	4.39	24.80	5.64	28.60	6.96	29.00	7.00	29.40	7.03	30.10	7.09	30.90	7.16
	35	20.80	4.67	24.80	6.01	28.10	7.21	28.50	7.25	28.90	7.29	29.60	7.36	30.40	7.42
	37	20.80	4.97	24.80	6.40	27.70	7.47	28.10	7.50	28.40	7.54	29.20	7.62	29.90	7.69
	39	20.80	5.28	24.80	6.81	27.20	7.72	27.60	7.76	28.00	7.80	28.70	7.88	29.50	7.96
	41	20.80	5.33	24.80	6.87	26.99	7.78	27.39	7.82	27.79	7.86	28.34	7.93	28.61	8.01
	43	20.80	5.39	24.80	6.96	26.77	7.83	27.17	7.87	27.57	7.91	28.08	7.96	28.17	8.17
	45	20.80	5.56	24.80	6.99	26.50	7.91	26.89	7.97	27.33	7.98	27.80	8.18	27.91	8.36
	48	22.78	4.11	27.16	5.12	28.60	5.78	28.98	5.87	29.59	5.84	29.94	6.35	30.17	6.13
100%	-5	18.90	2.26	22.50	2.72	26.20	3.24	28.00	3.47	29.80	3.77	33.50	4.29	35.40	4.48
	-2	18.90	2.29	22.50	2.76	26.20	3.28	28.00	3.54	29.80	3.82	33.50	4.34	35.40	4.51
	0	18.90	2.31	22.50	2.79	26.20	3.31	28.00	3.58	29.80	3.85	33.50	4.41	35.40	4.56
	2	18.90	2.36	22.50	2.82	26.20	3.35	28.00	3.63	29.80	3.90	33.50	4.48	35.40	4.63
	4	18.90	2.37	22.50	2.85	26.20	3.40	28.00	3.68	29.80	3.95	33.50	4.52	35.40	4.68
	6	18.90	2.41	22.50	2.91	26.20	3.44	28.00	3.74	29.80	4.00	33.50	4.59	35.40	4.75
	8	18.90	2.46	22.50	2.95	26.20	3.50	28.00	3.79	29.80	4.07	33.50	4.66	35.40	4.83
	10	18.90	2.48	22.50	3.01	26.20	3.56	28.00	3.85	29.80	4.14	33.50	4.74	35.40	4.90
	12	18.90	2.52	22.50	3.07	26.20	3.63	28.00	3.92	29.80	4.22	33.50	4.82	34.90	4.94
	14	18.90	2.57	22.50	3.12	26.20	3.70	28.00	4.00	29.80	4.30	33.50	4.92	34.50	5.00
	16	18.90	2.62	22.50	3.18	26.20	3.77	28.00	4.08	29.80	4.39	33.30	4.98	34.00	5.06
	18	18.90	2.67	22.50	3.24	26.20	3.84	28.00	4.15	29.80	4.47	32.90	5.14	33.60	5.18
	20	18.90	2.72	22.50	3.31	26.20	3.96	28.00	4.37	29.80	4.79	32.40	5.39	33.10	5.43
	21	18.90	2.75	22.50	3.34	26.20	4.10	28.00	4.52	29.80	4.96	32.20	5.51	32.90	5.56
	23	18.90	2.81	22.50	3.56	26.20	4.40	28.00	4.84	29.80	5.32	31.80	5.76	32.40	5.81
	25	18.90	3.00	22.50	3.80	26.20	4.71	28.00	5.19	29.80	5.70	31.30	6.02	32.00	6.06
	27	18.90	3.20	22.50	4.06	26.20	5.03	28.00	5.55	29.80	6.09	30.80	6.27	31.50	6.33
	29	18.90	3.41	22.50	4.33	26.20	5.37	28.00	5.93	29.70	6.47	30.40	6.53	31.10	6.58
	31	18.90	3.63	22.50	4.62	26.20	5.72	28.00	6.33	29.30	6.72	29.90	6.78	30.60	6.84
	33	18.90	3.85	22.50	4.92	26.20	6.10	28.00	6.75	28.80	6.98	29.50	7.04	30.20	7.10
	35	18.90	4.09	22.50	5.23	26.20	6.51	28.00	7.20	28.30	7.23	29.00	7.30	29.70	7.36
	37	18.90	4.36	22.50	5.57	26.20	6.94	27.50	7.45	27.90	7.49	28.60	7.56	29.20	7.62
	39	18.90	4.63	22.50	5.92	26.20	7.38	27.10	7.70	27.40	7.74	28.10	7.81	28.80	7.89
	41	18.90	4.84	22.50	6.14	26.20	7.65	26.68	7.76	27.19	7.86	27.61	7.99	28.38	8.05
	43	18.90	5.06	22.50	6.35	26.20	7.80	26.26	7.85	26.99	7.94	27.78	8.05	27.88	8.14
	45	18.90	5.35	22.50	6.64	26.20	7.93	25.70	7.96	26.85	8.08	27.54	8.17	27.32	8.25
	48	19.57	5.62	23.30	6.87	27.14	7.94	25.52	7.84	27.77	8.17	26.78	8.15	27.68	8.23
90%	-5	17.00	2.00	20.30	2.40	23.60	2.83	25.20	3.09	26.80	3.28	30.10	3.78	33.40	4.33
	-2	17.00	2.02	20.30	2.42	23.60	2.87	25.20	3.13	26.80	3.32	30.10	3.81	33.40	4.37
	0	17.00	2.05	20.30	2.45	23.60	2.91	25.20	3.17	26.80	3.37	30.10	3.86	33.40	4.40
	2	17.00	2.08	20.30	2.49	23.60	2.94	25.20	3.22	26.80	3.42	30.10	3.94	33.40	4.47
	4	17.00	2.11	20.30	2.52	23.60	2.99	25.20	3.26	26.80	3.46	30.10	4.00	33.40	4.53
	6	17.00	2.14	20.30	2.57	23.60	3.05	25.20	3.32	26.80	3.52	30.10	4.06	33.40	4.61
	8	17.00	2.18	20.30	2.62	23.60	3.11	25.20	3.36	26.80	3.59	30.10	4.14	33.40	4.65
	10	17.00	2.22	20.30	2.68	23.60	3.16	25.20	3.42	26.80	3.67	30.10	4.19	33.40	4.73
	12	17.00	2.26	20.30	2.73	23.60	3.22	25.20	3.47	26.80	3.74	30.10	4.27	33.40	4.81
	14	17.00	2.30	20.30	2.78	23.60	3.28	25.20	3.54	26.80	3.80	30.10	4.35	33.40	4.90
	16	17.00	2.34	20.30	2.82	23.60	3.35	25.20	3.61	26.80	3.88	30.10	4.43	33.30	4.99
	18	17.00	2.38	20.30	2.88	23.60	3.41	25.20	3.68	26.80	3.96	30.10	4.52	32.90	5.14
	20	17.00	2.43	20.30	2.95	23.60	3.47	25.20	3.75	26.80	4.10	30.10	4.86	32.40	5.39

Specification and performance

MCAC-VTSM-2012-09

	21	17.00	2.45	20.30	2.97	23.60	3.53	25.20	3.88	26.80	4.25	30.10	5.04	32.20	5.51
	23	17.00	2.49	20.30	3.09	23.60	3.78	25.20	4.16	26.80	4.56	30.10	5.40	31.70	5.76
	25	17.00	2.63	20.30	3.30	23.60	4.05	25.20	4.45	26.80	4.87	30.10	5.78	31.30	6.02
	27	17.00	2.79	20.30	3.51	23.60	4.32	25.20	4.75	26.80	5.21	30.10	6.19	30.80	6.27
	29	17.00	2.98	20.30	3.75	23.60	4.61	25.20	5.07	26.80	5.57	29.80	6.47	30.40	6.52
	31	17.00	3.16	20.30	3.99	23.60	4.91	25.20	5.41	26.80	5.94	29.30	6.72	29.90	6.78
	33	17.00	3.36	20.30	4.24	23.60	5.24	25.20	5.77	26.80	6.34	28.90	6.99	29.50	7.03
	35	17.00	3.57	20.30	4.51	23.60	5.58	25.20	6.15	26.80	6.75	28.40	7.24	29.00	7.30
	37	17.00	3.78	20.30	4.79	23.60	5.94	25.20	6.55	26.80	7.20	27.90	7.49	28.60	7.55
	39	17.00	4.02	20.30	5.10	23.60	6.32	25.20	6.98	26.80	7.67	27.50	7.75	28.10	7.81
	41	17.00	4.16	20.30	5.33	23.60	6.55	25.20	7.16	26.80	7.71	27.31	7.95	27.91	8.00
	43	17.00	4.36	20.30	5.57	23.60	6.78	25.20	7.35	26.80	7.88	27.17	8.05	27.67	8.12
	45	17.00	4.63	20.30	5.84	23.60	7.05	25.20	7.59	26.80	8.09	27.02	8.14	27.25	8.23
	48	17.00	3.55	20.30	4.41	23.60	5.27	25.20	5.65	26.80	5.89	29.77	5.87	29.46	5.94
80%	-5	15.10	1.76	18.00	2.08	20.90	2.47	22.40	2.62	23.90	2.82	26.80	3.26	29.70	3.73
	-2	15.10	1.79	18.00	2.11	20.90	2.49	22.40	2.66	23.90	2.85	26.80	3.30	29.70	3.76
	0	15.10	1.82	18.00	2.13	20.90	2.52	22.40	2.69	23.90	2.90	26.80	3.34	29.70	3.81
	2	15.10	1.86	18.00	2.17	20.90	2.55	22.40	2.75	23.90	2.95	26.80	3.41	29.70	3.89
	4	15.10	1.89	18.00	2.20	20.90	2.60	22.40	2.81	23.90	3.01	26.80	3.47	29.70	3.94
	6	15.10	1.92	18.00	2.25	20.90	2.64	22.40	2.87	23.90	3.06	26.80	3.52	29.70	4.01
	8	15.10	1.95	18.00	2.31	20.90	2.70	22.40	2.92	23.90	3.13	26.80	3.58	29.70	4.08
	10	15.10	1.97	18.00	2.36	20.90	2.78	22.40	2.99	23.90	3.20	26.80	3.66	29.70	4.12
	12	15.10	2.00	18.00	2.40	20.90	2.82	22.40	3.05	23.90	3.27	26.80	3.73	29.70	4.20
	14	15.10	2.04	18.00	2.45	20.90	2.87	22.40	3.10	23.90	3.33	26.80	3.79	29.70	4.28
	16	15.10	2.07	18.00	2.48	20.90	2.93	22.40	3.15	23.90	3.39	26.80	3.87	29.70	4.36
	18	15.10	2.11	18.00	2.53	20.90	2.99	22.40	3.22	23.90	3.45	26.80	3.95	29.70	4.44
	20	15.10	2.14	18.00	2.58	20.90	3.05	22.40	3.28	23.90	3.52	26.80	4.10	29.70	4.75
	21	15.10	2.16	18.00	2.60	20.90	3.08	22.40	3.32	23.90	3.60	26.80	4.24	29.70	4.93
	23	15.10	2.20	18.00	2.66	20.90	3.22	22.40	3.53	23.90	3.85	26.80	4.54	29.70	5.29
	25	15.10	2.27	18.00	2.82	20.90	3.44	22.40	3.77	23.90	4.11	26.80	4.86	29.70	5.66
	27	15.10	2.42	18.00	3.01	20.90	3.67	22.40	4.03	23.90	4.40	26.80	5.19	29.70	6.05
	29	15.10	2.57	18.00	3.20	20.90	3.91	22.40	4.29	23.90	4.70	26.80	5.54	29.70	6.47
	31	15.10	2.73	18.00	3.41	20.90	4.16	22.40	4.57	23.90	5.01	26.80	5.92	29.20	6.72
	33	15.10	2.90	18.00	3.62	20.90	4.43	22.40	4.87	23.90	5.33	26.80	6.31	28.80	6.98
	35	15.10	3.08	18.00	3.85	20.90	4.72	22.40	5.18	23.90	5.68	26.80	6.72	28.30	7.23
	37	15.10	3.26	18.00	4.08	20.90	5.02	22.40	5.52	23.90	6.05	26.80	7.17	27.90	7.48
	39	15.10	3.45	18.00	4.36	20.90	5.34	22.40	5.87	23.90	6.43	26.80	7.64	27.40	7.74
	41	15.10	3.53	18.00	4.40	20.90	5.42	22.40	6.03	23.90	6.55	26.80	7.83	27.23	7.88
	43	15.10	3.64	18.00	4.43	20.90	5.49	22.40	6.13	23.90	6.64	26.80	7.92	27.06	7.96
	45	15.10	3.74	18.00	4.49	20.90	5.60	22.40	6.26	23.90	6.76	26.80	8.01	26.73	8.10
	48	15.10	2.45	18.00	2.93	23.51	3.69	22.40	4.16	23.90	4.45	26.80	5.25	29.82	5.37
70%	-5	13.20	1.57	15.80	1.84	18.30	2.09	19.60	2.24	20.90	2.39	23.40	2.74	26.00	3.15
	-2	13.20	1.59	15.80	1.85	18.30	2.10	19.60	2.28	20.90	2.43	23.40	2.78	26.00	3.19
	0	13.20	1.59	15.80	1.88	18.30	2.15	19.60	2.33	20.90	2.48	23.40	2.83	26.00	3.23
	2	13.20	1.60	15.80	1.89	18.30	2.18	19.60	2.37	20.90	2.52	23.40	2.90	26.00	3.28
	4	13.20	1.62	15.80	1.93	18.30	2.23	19.60	2.41	20.90	2.58	23.40	2.94	26.00	3.36
	6	13.20	1.65	15.80	1.97	18.30	2.28	19.60	2.49	20.90	2.64	23.40	2.99	26.00	3.43
	8	13.20	1.68	15.80	2.02	18.30	2.34	19.60	2.53	20.90	2.69	23.40	3.08	26.00	3.49
	10	13.20	1.71	15.80	2.06	18.30	2.40	19.60	2.58	20.90	2.77	23.40	3.14	26.00	3.53
	12	13.20	1.76	15.80	2.09	18.30	2.45	19.60	2.63	20.90	2.81	23.40	3.20	26.00	3.60
	14	13.20	1.79	15.80	2.12	18.30	2.48	19.60	2.67	20.90	2.86	23.40	3.26	26.00	3.67
	16	13.20	1.81	15.80	2.16	18.30	2.53	19.60	2.73	20.90	2.92	23.40	3.32	26.00	3.74
	18	13.20	1.84	15.80	2.20	18.30	2.58	19.60	2.78	20.90	2.97	23.40	3.39	26.00	3.81
	20	13.20	1.87	15.80	2.24	18.30	2.63	19.60	2.82	20.90	3.03	23.40	3.45	26.00	3.92
	21	13.20	1.89	15.80	2.26	18.30	2.65	19.60	2.85	20.90	3.06	23.40	3.50	26.00	4.06
	23	13.20	1.92	15.80	2.30	18.30	2.71	19.60	2.95	20.90	3.21	23.40	3.76	26.00	4.35
	25	13.20	1.96	15.80	2.40	18.30	2.88	19.60	3.15	20.90	3.43	23.40	4.02	26.00	4.65
	27	13.20	2.08	15.80	2.55	18.30	3.08	19.60	3.36	20.90	3.66	23.40	4.29	26.00	4.97
	29	13.20	2.20	15.80	2.71	18.30	3.27	19.60	3.58	20.90	3.89	23.40	4.57	26.00	5.31
	31	13.20	2.33	15.80	2.87	18.30	3.48	19.60	3.80	20.90	4.14	23.40	4.87	26.00	5.66
	33	13.20	2.47	15.80	3.06	18.30	3.71	19.60	4.05	20.90	4.42	23.40	5.19	26.00	6.04
	35	13.20	2.62	15.80	3.24	18.30	3.93	19.60	4.31	20.90	4.70	23.40	5.53	26.00	6.43
	37	13.20	2.77	15.80	3.44	18.30	4.18	19.60	4.57	20.90	5.00	23.40	5.89	26.00	6.85
	39	13.20	2.93	15.80	3.64	18.30	4.43	19.60	4.86	20.90	5.31	23.40	6.26	26.00	7.30

	41	13.20	3.06	15.80	3.77	18.30	4.56	19.60	5.02	20.90	5.47	23.40	6.52	26.00	7.62
	43	13.20	3.31	15.80	4.03	18.30	4.75	19.60	5.29	20.90	5.63	23.40	6.75	26.00	7.86
	45	13.20	3.38	15.80	4.11	18.30	4.85	19.60	5.38	20.90	5.91	23.40	7.12	26.00	8.16
	48	13.20	6.35	15.80	7.70	18.30	9.08	19.60	9.93	20.90	10.72	23.40	12.93	26.00	14.68
60%	-5	11.30	1.34	13.50	1.56	15.70	1.81	16.80	1.93	17.90	2.09	20.10	2.34	22.30	2.69
	-2	11.30	1.35	13.50	1.58	15.70	1.85	16.80	1.96	17.90	2.11	20.10	2.38	22.30	2.70
	0	11.30	1.37	13.50	1.60	15.70	1.87	16.80	1.98	17.90	2.14	20.10	2.41	22.30	2.74
	2	11.30	1.39	13.50	1.64	15.70	1.91	16.80	2.02	17.90	2.17	20.10	2.46	22.30	2.77
	4	11.30	1.43	13.50	1.67	15.70	1.94	16.80	2.05	17.90	2.20	20.10	2.50	22.30	2.81
	6	11.30	1.45	13.50	1.70	15.70	1.98	16.80	2.09	17.90	2.25	20.10	2.55	22.30	2.88
	8	11.30	1.48	13.50	1.73	15.70	2.02	16.80	2.13	17.90	2.29	20.10	2.60	22.30	2.93
	10	11.30	1.50	13.50	1.77	15.70	2.05	16.80	2.19	17.90	2.34	20.10	2.65	22.30	2.97
	12	11.30	1.53	13.50	1.79	15.70	2.09	16.80	2.23	17.90	2.38	20.10	2.70	22.30	3.02
	14	11.30	1.55	13.50	1.82	15.70	2.12	16.80	2.27	17.90	2.43	20.10	2.75	22.30	3.08
	16	11.30	1.57	13.50	1.85	15.70	2.15	16.80	2.31	17.90	2.46	20.10	2.79	22.30	3.13
	18	11.30	1.60	13.50	1.88	15.70	2.19	16.80	2.35	17.90	2.51	20.10	2.84	22.30	3.19
	20	11.30	1.62	13.50	1.92	15.70	2.23	16.80	2.40	17.90	2.56	20.10	2.90	22.30	3.26
	21	11.30	1.64	13.50	1.93	15.70	2.25	16.80	2.42	17.90	2.58	20.10	2.93	22.30	3.29
	23	11.30	1.66	13.50	1.97	15.70	2.29	16.80	2.46	17.90	2.63	20.10	3.05	22.30	3.50
	25	11.30	1.69	13.50	2.00	15.70	2.38	16.80	2.58	17.90	2.79	20.10	3.25	22.30	3.74
	27	11.30	1.76	13.50	2.12	15.70	2.53	16.80	2.76	17.90	2.98	20.10	3.46	22.30	3.99
	29	11.30	1.85	13.50	2.25	15.70	2.70	16.80	2.93	17.90	3.17	20.10	3.70	22.30	4.26
	31	11.30	1.97	13.50	2.39	15.70	2.86	16.80	3.11	17.90	3.38	20.10	3.93	22.30	4.53
	33	11.30	2.08	13.50	2.53	15.70	3.04	16.80	3.31	17.90	3.59	20.10	4.18	22.30	4.83
	35	11.30	2.20	13.50	2.69	15.70	3.22	16.80	3.51	17.90	3.81	20.10	4.45	22.30	5.14
	37	11.30	2.33	13.50	2.84	15.70	3.42	16.80	3.73	17.90	4.05	20.10	4.73	22.30	5.47
	39	11.30	2.45	13.50	3.01	15.70	3.62	16.80	3.95	17.90	4.30	20.10	5.03	22.30	5.82
	41	11.30	2.53	13.50	3.14	15.70	3.75	16.80	4.11	17.90	4.46	20.10	5.26	22.30	6.08
	43	11.30	2.61	13.50	3.27	15.70	3.88	16.80	4.23	17.90	4.61	20.10	5.49	22.30	6.35
	45	11.30	2.74	13.50	3.44	15.70	4.04	16.80	4.39	17.90	4.84	20.10	5.73	22.30	6.70
	48	11.30	3.83	13.50	4.77	15.70	5.53	16.80	6.05	17.90	6.79	20.10	7.86	22.30	9.40
50%	-5	9.45	1.17	11.30	1.35	13.10	1.55	14.00	1.62	14.90	1.71	16.70	1.94	18.60	2.10
	-2	9.45	1.17	11.30	1.37	13.10	1.56	14.00	1.64	14.90	1.74	16.70	1.97	18.60	2.12
	0	9.45	1.19	11.30	1.40	13.10	1.59	14.00	1.67	14.90	1.76	16.70	2.00	18.60	2.16
	2	9.45	1.21	11.30	1.41	13.10	1.62	14.00	1.69	14.90	1.79	16.70	2.01	18.60	2.20
	4	9.45	1.22	11.30	1.44	13.10	1.64	14.00	1.71	14.90	1.83	16.70	2.06	18.60	2.26
	6	9.45	1.24	11.30	1.46	13.10	1.66	14.00	1.75	14.90	1.86	16.70	2.09	18.60	2.32
	8	9.45	1.27	11.30	1.49	13.10	1.69	14.00	1.79	14.90	1.89	16.70	2.13	18.60	2.40
	10	9.45	1.30	11.30	1.50	13.10	1.72	14.00	1.82	14.90	1.94	16.70	2.18	18.60	2.44
	12	9.45	1.31	11.30	1.52	13.10	1.75	14.00	1.85	14.90	1.98	16.70	2.22	18.60	2.47
	14	9.45	1.33	11.30	1.54	13.10	1.77	14.00	1.89	14.90	2.01	16.70	2.26	18.60	2.52
	16	9.45	1.35	11.30	1.56	13.10	1.80	14.00	1.92	14.90	2.04	16.70	2.30	18.60	2.56
	18	9.45	1.37	11.30	1.59	13.10	1.82	14.00	1.95	14.90	2.08	16.70	2.34	18.60	2.61
	20	9.45	1.39	11.30	1.61	13.10	1.85	14.00	1.98	14.90	2.12	16.70	2.38	18.60	2.66
	21	9.45	1.40	11.30	1.63	13.10	1.87	14.00	2.00	14.90	2.13	16.70	2.41	18.60	2.69
	23	9.45	1.42	11.30	1.65	13.10	1.90	14.00	2.04	14.90	2.17	16.70	2.45	18.60	2.75
	25	9.45	1.44	11.30	1.68	13.10	1.94	14.00	2.08	14.90	2.24	16.70	2.57	18.60	2.93
	27	9.45	1.47	11.30	1.75	13.10	2.05	14.00	2.21	14.90	2.38	16.70	2.74	18.60	3.12
	29	9.45	1.54	11.30	1.84	13.10	2.17	14.00	2.35	14.90	2.53	16.70	2.91	18.60	3.33
	31	9.45	1.63	11.30	1.95	13.10	2.30	14.00	2.49	14.90	2.69	16.70	3.09	18.60	3.54
	33	9.45	1.73	11.30	2.07	13.10	2.45	14.00	2.64	14.90	2.85	16.70	3.29	18.60	3.76
	35	9.45	1.82	11.30	2.18	13.10	2.58	14.00	2.79	14.90	3.02	16.70	3.49	18.60	4.00
	37	9.45	1.92	11.30	2.31	13.10	2.74	14.00	2.96	14.90	3.20	16.70	3.71	18.60	4.25
	39	9.45	2.03	11.30	2.44	13.10	2.89	14.00	3.13	14.90	3.40	16.70	3.93	18.60	4.51
	41	9.45	2.11	11.30	2.54	13.10	3.00	14.00	3.28	14.90	3.54	16.70	4.14	18.60	4.72
	43	9.45	2.25	11.30	2.71	13.10	3.10	14.00	3.43	14.90	3.63	16.70	4.35	18.60	4.93
	45	9.45	2.30	11.30	2.78	13.10	3.31	14.00	3.69	14.90	3.79	16.70	4.77	18.60	5.35
	48	9.45	2.44	11.30	2.97	13.10	3.43	14.00	3.83	14.90	3.87	16.70	5.01	18.60	5.59

10HP heating mode

Combination (Capacity index)	Outdoor air temp.		Indoor temperature(°C DB)											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-19.8	-20	20.40	5.38	20.30	5.75	20.20	6.14	20.20	6.33	20.10	6.51	20.10	6.90
	-18.8	-19	20.70	5.50	20.60	5.87	20.60	6.25	20.50	6.43	20.50	6.61	20.40	6.99
	-16.7	-17	21.50	5.75	21.40	6.11	21.30	6.47	21.30	6.65	21.30	6.83	21.20	7.19
	-13.7	-15	22.40	6.02	22.30	6.36	22.20	6.71	22.20	6.88	22.10	7.06	22.10	7.40
	-11.8	-13	23.30	6.29	23.30	6.62	23.20	6.95	23.10	7.12	23.10	7.28	23.00	7.61
	-9.8	-11	24.40	6.56	24.30	6.88	24.20	7.20	24.20	7.35	24.20	7.51	24.10	7.83
	-9.5	-10	25.00	6.70	24.90	7.01	24.80	7.31	24.80	7.47	24.70	7.62	24.70	7.93
	-8.5	-9.1	25.50	6.82	25.40	7.12	25.40	7.42	25.30	7.57	25.30	7.72	25.20	8.03
	-7	-7.6	26.40	7.02	26.40	7.31	26.30	7.60	26.30	7.75	26.20	7.89	26.10	8.18
	-5	-5.6	27.80	7.28	27.70	7.56	27.60	7.84	27.60	7.98	27.50	8.10	27.50	8.38
	-3	-3.7	29.10	7.52	29.00	7.79	29.00	8.05	28.90	8.18	28.90	8.31	28.80	8.57
	0	-0.7	31.40	7.89	31.40	8.13	31.30	8.37	31.30	8.46	31.20	8.62	31.20	8.86
	3	2.2	33.90	8.21	33.80	8.44	33.70	8.67	33.70	8.78	33.70	8.90	33.60	9.11
	5	4.1	35.60	8.42	35.50	8.64	35.50	8.85	35.40	8.95	35.40	9.06	35.30	9.27
	7	6	37.40	8.62	37.30	8.82	37.30	9.02	37.20	9.12	37.20	9.22	35.70	8.86
	9	7.9	39.30	8.80	39.20	8.99	39.20	9.18	39.10	9.28	38.30	9.08	35.70	8.32
	11	9.8	41.30	8.97	41.20	9.15	41.00	9.27	39.60	8.90	38.30	8.54	35.70	7.84
	13	11.8	43.50	9.14	43.40	9.32	41.00	8.69	39.60	8.34	38.30	8.02	35.70	7.35
	15	13.7	45.60	9.30	43.60	8.83	41.00	8.18	39.60	7.87	38.30	7.55	35.70	6.94
120%	-19.8	-20	20.30	5.89	20.20	6.24	20.10	6.59	20.10	6.76	20.10	6.94	20.00	7.29
	-18.8	-19	20.60	6.00	20.50	6.35	20.50	6.69	20.40	6.86	20.40	7.04	20.30	7.38
	-16.7	-17	21.40	6.24	21.30	6.57	21.17	6.90	21.20	7.07	21.20	7.23	21.10	7.56
	-13.7	-15	22.30	6.48	22.20	6.80	22.10	7.12	22.10	7.28	22.10	7.44	22.00	7.76
	-11.8	-13	23.20	6.73	23.20	7.04	23.10	7.34	23.10	7.50	23.00	7.65	23.00	7.96
	-9.8	-11	24.30	6.99	24.20	7.27	24.20	7.57	24.10	7.72	24.10	7.86	24.00	8.15
	-9.5	-10	24.90	7.12	24.80	7.40	24.70	7.68	24.70	7.83	24.70	7.97	24.60	8.25
	-8.5	-9.1	25.40	7.22	25.30	7.50	25.30	7.78	25.20	7.92	25.20	8.07	25.10	8.34
	-7	-7.6	26.30	7.41	26.30	7.68	26.20	7.95	26.20	8.08	26.10	8.21	26.10	8.48
	-5	-5.6	27.70	7.65	27.60	7.91	27.50	8.16	27.50	8.29	27.50	8.42	27.40	8.67
	-3	-3.7	29.00	7.88	29.00	8.12	28.90	8.36	28.90	8.48	28.80	8.61	28.80	8.85
	0	-0.7	31.30	8.21	31.30	8.44	31.20	8.66	31.20	8.78	31.10	8.88	31.10	9.11
	3	2.2	33.80	8.52	33.70	8.73	33.70	8.93	33.60	9.04	33.60	9.14	32.90	9.09
	5	4.1	35.50	8.71	35.40	8.91	35.40	9.10	35.30	9.20	35.30	9.30	32.90	8.54
	7	6	37.30	8.88	37.30	9.07	37.20	9.26	36.60	9.13	35.40	8.76	32.90	8.04
	9	7.9	39.20	9.06	39.10	9.24	37.80	8.93	36.60	8.58	35.40	8.23	32.90	7.56
	11	9.8	41.20	9.22	40.20	9.06	37.80	8.40	36.60	8.07	35.40	7.75	32.90	7.13
	13	11.8	42.70	9.13	40.20	8.50	37.80	7.88	36.60	7.58	35.40	7.28	32.90	6.70
	15	13.7	42.70	8.60	40.20	8.01	37.80	7.43	36.60	7.15	35.40	6.87	32.90	6.32
110%	-19.8	-20	20.20	6.40	20.10	6.72	20.00	7.05	20.00	7.21	20.01	7.36	19.90	7.69
	-18.8	-19	20.50	6.50	20.40	6.82	20.40	7.14	20.40	7.29	20.30	7.45	20.30	7.77
	-16.7	-17	21.30	6.72	21.20	7.03	21.50	7.33	21.10	7.48	21.10	7.64	21.00	7.94
	-13.7	-15	22.20	6.95	22.10	7.24	22.00	7.53	22.00	7.68	22.00	7.83	21.90	8.11
	-11.8	-13	23.10	7.18	23.10	7.46	23.00	7.74	23.00	7.88	22.90	8.02	22.90	8.30
	-9.8	-11	24.20	7.41	24.10	7.68	24.10	7.95	24.00	8.08	24.00	8.21	24.00	8.48
	-9.5	-10	24.80	7.53	24.70	7.79	24.60	8.06	24.60	8.18	24.60	8.31	24.50	8.57
	-8.5	-9.1	25.30	7.63	25.20	7.89	25.20	8.14	25.10	8.27	25.10	8.40	25.10	7.66
	-7	-7.6	26.20	7.81	26.20	8.04	26.10	8.29	26.10	8.42	26.10	8.54	26.00	8.79
	-5	-5.6	27.60	8.03	27.50	8.26	27.40	8.49	27.40	8.61	27.40	8.73	27.30	8.97
	-3	-3.7	28.90	8.23	28.90	8.45	28.80	8.68	28.80	8.79	28.70	8.90	28.70	9.12
	0	-0.7	31.20	8.54	31.20	8.75	31.10	8.95	31.10	9.05	31.10	9.16	30.20	8.98
	3	2.2	33.70	8.83	33.60	9.01	33.60	9.20	33.50	9.29	32.40	8.91	30.20	8.17
	5	4.1	35.40	8.99	35.40	9.18	34.70	9.09	33.50	8.73	32.40	8.38	30.20	7.69
	7	6	37.20	9.16	36.90	9.22	34.70	8.54	33.50	8.20	32.40	7.88	30.20	7.23
	9	7.9	39.10	9.31	36.90	8.67	34.70	8.03	33.50	7.72	32.40	7.41	30.20	6.82
	11	9.8	39.10	8.76	36.90	8.15	34.70	7.56	33.50	7.27	32.40	6.99	30.20	6.43
	13	11.8	39.10	8.21	36.90	7.65	34.70	7.11	33.50	6.84	32.40	6.57	30.20	6.06
	15	13.7	39.10	7.29	36.90	7.21	34.70	6.71	33.50	6.45	32.40	6.22	30.20	5.73
100%	-19.8	-20	20.10	6.92	20.00	7.21	20.00	7.50	19.90	7.65	19.90	7.79	19.80	8.08
	-18.8	-19	20.40	7.01	20.40	7.29	20.30	7.58	20.30	7.73	20.20	7.88	20.20	8.16

	-16.7	-17	21.20	7.21	21.10	7.48	21.10	7.76	21.00	7.90	21.00	8.03	21.00	8.31
	-13.7	-15	22.10	7.41	22.00	7.68	21.90	7.95	21.90	8.08	21.90	8.21	21.80	8.48
	-11.8	-13	23.00	7.63	23.00	7.88	22.90	8.13	22.90	8.26	22.90	8.39	22.80	8.65
	-9.8	-11	24.10	7.84	24.00	8.08	24.00	8.32	24.00	8.45	23.90	8.57	23.90	8.81
	-9.5	-10	24.70	7.95	24.60	8.18	24.60	8.42	24.50	8.54	24.50	8.66	24.40	8.89
	-8.5	-9.1	25.20	8.03	25.10	8.27	25.10	8.50	25.10	8.62	25.00	8.74	25.00	8.96
	-7	-7.6	26.10	8.19	26.10	8.42	26.00	8.64	26.00	8.76	26.00	8.86	25.90	9.09
	-5	-5.6	27.50	8.40	27.40	8.61	27.40	8.83	27.30	8.92	27.30	9.03	27.20	9.25
	-3	-3.7	28.80	8.59	28.80	7.80	28.70	8.99	28.70	9.09	28.70	9.19	27.50	8.81
	0	-0.7	31.10	8.86	31.10	9.05	31.00	9.24	30.50	9.09	29.50	8.72	27.50	8.00
	3	2.2	33.60	9.12	33.50	9.29	31.50	8.60	30.50	8.26	29.50	7.94	27.50	7.28
	5	4.1	35.30	9.29	33.50	8.73	31.50	8.08	30.50	7.78	29.50	7.47	27.50	6.87
	7	6	35.50	8.82	33.50	8.20	31.50	7.61	30.50	7.32	29.50	7.04	27.50	6.47
	9	7.9	35.50	8.28	33.50	7.72	31.50	7.17	30.50	6.81	29.50	6.63	27.50	6.11
	11	9.8	35.50	7.80	33.50	7.27	31.50	6.76	30.50	6.50	29.50	6.26	27.50	5.77
	13	11.8	35.50	7.32	33.50	6.84	31.50	6.37	30.50	6.13	29.50	5.90	27.50	5.45
	15	13.7	35.50	6.91	33.50	6.45	31.50	6.01	30.50	5.79	29.50	5.57	27.50	5.16
90%	-19.8	-20	19.96	7.43	19.86	7.69	19.86	7.96	19.77	8.08	19.77	8.22	19.77	8.48
	-18.8	-19	20.26	7.51	20.26	7.78	20.17	8.03	20.17	8.16	20.17	8.29	20.06	8.55
	-16.7	-17	21.06	7.70	20.96	7.95	20.96	8.19	20.96	8.32	20.86	8.44	20.86	8.69
	-13.7	-15	21.96	7.89	21.86	8.12	21.86	8.36	21.76	8.48	21.76	8.60	21.76	8.84
	-11.8	-13	22.86	8.07	22.86	8.30	22.76	8.53	22.76	8.65	22.76	8.76	22.66	8.98
	-9.8	-11	23.96	8.26	23.96	8.48	23.86	8.70	23.86	8.81	23.86	8.92	23.76	9.14
	-9.5	-10	24.56	8.36	24.46	8.58	24.46	8.79	24.36	8.89	24.36	9.00	24.36	9.21
	-8.5	-9.1	25.06	8.45	25.06	8.66	24.96	8.86	24.96	8.96	24.96	9.07	24.66	9.16
	-7	-7.6	25.95	8.59	25.95	8.79	25.86	8.99	25.86	9.09	25.86	9.19	24.66	8.75
	-5	-5.6	27.35	8.78	27.25	8.96	27.25	9.15	27.15	9.25	26.45	8.96	24.66	8.22
	-3	-3.7	28.65	8.94	28.65	9.12	28.35	9.16	27.35	8.80	26.45	8.44	24.66	7.75
	0	-0.7	31.05	9.20	30.15	8.97	28.35	8.31	27.35	7.99	26.45	7.67	24.66	7.05
	3	2.2	31.94	8.77	30.15	8.16	28.35	7.57	27.35	7.28	26.45	7.00	24.66	6.44
	5	4.1	31.94	8.24	30.15	7.68	28.35	7.14	27.35	6.86	26.45	6.60	24.66	6.08
	7	6	31.94	7.75	30.15	7.23	28.35	6.72	27.35	6.47	26.45	6.23	24.66	5.74
	9	7.9	31.94	7.30	30.15	6.81	28.35	6.33	27.35	6.11	26.45	5.88	24.66	5.43
	11	9.8	31.94	6.88	30.15	6.42	28.35	5.99	27.35	5.77	26.45	5.55	24.66	5.14
	13	11.8	31.94	6.47	30.15	6.06	28.35	5.64	27.35	5.45	26.45	5.25	24.66	4.85
	15	13.7	31.94	6.12	30.15	5.72	28.35	5.35	27.35	5.16	26.45	4.97	24.66	4.61
80%	-19.8	-20	19.90	7.95	19.80	8.17	19.80	8.41	19.80	8.53	19.70	8.65	19.70	8.87
	-18.8	-19	20.20	8.01	20.20	8.25	20.10	8.48	20.10	8.60	20.10	8.71	20.00	8.94
	-16.7	-17	21.00	8.18	20.90	8.40	20.90	8.63	20.90	8.74	20.90	8.84	20.80	9.06
	-13.7	-15	21.90	8.35	21.80	8.56	21.80	8.78	21.80	8.87	21.70	8.98	21.70	9.20
	-11.8	-13	22.80	8.52	22.80	8.73	22.70	8.92	22.70	9.02	22.70	9.13	22.00	8.88
	-9.8	-11	23.90	8.69	23.90	8.88	23.80	9.08	23.80	9.17	23.60	9.15	22.00	8.39
	-9.5	-10	24.50	8.78	24.40	8.96	24.40	9.15	24.40	9.25	23.60	8.88	22.00	8.14
	-8.5	-9.1	25.00	8.85	23.24	9.04	24.90	9.22	24.40	9.01	23.60	8.65	22.00	7.93
	-7	-7.6	25.90	8.98	25.90	9.16	25.20	8.96	24.40	8.61	23.60	8.26	22.00	7.58
	-5	-5.6	27.30	9.14	26.80	9.09	25.20	8.42	24.40	8.09	23.60	7.77	22.00	7.14
	-3	-3.7	28.40	9.19	26.80	8.56	25.20	7.93	24.40	7.63	23.60	7.32	22.00	6.74
	0	-0.7	28.40	8.34	26.80	7.77	25.20	7.21	24.40	6.95	23.60	6.67	22.00	6.15
	3	2.2	28.40	7.60	26.80	7.09	25.20	6.59	24.40	6.34	23.60	6.11	22.00	5.63
	5	4.1	28.40	7.16	26.80	6.68	25.20	6.22	24.40	5.99	23.60	5.77	22.00	5.33
	7	6	28.40	6.74	26.80	6.31	25.20	5.87	24.40	5.66	23.60	5.46	22.00	5.04
	9	7.9	28.40	6.36	26.80	5.95	25.20	5.54	24.40	5.35	23.60	5.16	22.00	4.77
	11	9.8	28.40	6.01	26.80	5.62	25.20	5.25	24.40	5.06	23.60	4.88	22.00	4.53
	13	11.8	28.40	5.66	26.80	5.31	25.20	4.96	24.40	4.78	23.60	4.62	22.00	4.28
	15	13.7	28.40	5.36	26.80	5.03	25.20	4.70	24.40	4.54	23.60	4.38	22.00	4.07
70%	-19.8	-20	19.75	8.46	19.66	8.66	19.66	8.86	19.66	8.96	19.66	9.07	19.16	8.97
	-18.8	-19	20.05	8.53	20.05	8.73	19.96	8.92	19.96	9.02	19.96	9.13	19.16	8.79
	-16.7	-17	20.85	8.67	20.85	8.86	20.75	9.05	20.75	9.15	20.55	8.15	19.16	8.38
	-13.7	-15	21.75	8.82	21.65	9.00	21.65	9.19	21.25	9.05	20.55	8.69	19.16	7.97
	-11.8	-13	22.65	8.96	22.65	9.14	22.05	8.92	21.25	8.58	20.55	8.23	19.16	7.55
	-9.8	-11	23.75	9.11	23.45	9.10	22.05	8.43	21.25	8.10	20.55	7.78	19.16	7.15
	-9.5	-10	24.35	9.19	23.45	8.84	22.05	8.18	21.25	7.87	20.55	7.56	19.16	6.95
	-8.5	-9.1	24.84	9.24	23.45	8.60	22.05	7.97	21.25	7.66	20.55	7.36	19.16	6.77
	-7	-7.6	24.84	8.82	23.45	8.21	22.05	7.62	21.25	7.33	20.55	7.05	19.16	6.48

	-5	-5.6	24.84	8.29	23.45	7.73	22.05	7.17	21.25	6.90	20.55	8.15	19.16	6.12
	-3	-3.7	24.84	7.81	23.45	7.28	22.05	6.77	21.25	6.51	20.55	6.27	19.16	5.78
	0	-0.7	24.84	7.11	23.45	6.64	22.05	6.18	21.25	5.95	20.55	5.73	19.16	5.30
	3	2.2	24.84	6.49	23.45	6.08	22.05	5.66	21.25	5.46	20.55	5.26	19.16	4.86
	5	4.1	24.84	6.13	23.45	5.73	22.05	5.36	21.25	5.16	20.55	4.97	19.16	4.61
	7	6	24.84	5.79	23.45	5.43	22.05	5.06	21.25	4.88	20.55	4.71	19.16	4.37
	9	7.9	24.84	5.47	23.45	5.13	22.05	4.79	21.25	4.63	20.55	4.47	19.16	4.14
	11	9.8	24.84	5.18	23.45	4.85	22.05	4.55	21.25	4.39	20.55	4.24	19.16	3.93
	13	11.8	24.84	4.89	23.45	4.60	22.05	4.30	21.25	4.16	20.55	4.01	19.16	3.74
	15	13.7	24.84	4.63	23.45	4.36	22.05	4.08	21.25	3.95	20.55	3.81	19.16	3.56
60%	-19.8	-20	19.70	8.97	19.60	9.14	18.90	8.80	18.30	8.45	17.70	8.11	16.50	7.44
	-18.8	-19	20.00	9.03	20.00	9.20	18.90	8.61	18.30	8.27	17.70	7.94	16.50	7.28
	-16.7	-17	20.80	9.15	20.10	8.86	18.90	8.21	18.30	7.90	17.70	7.58	16.50	6.97
	-13.7	-15	21.30	9.05	20.10	8.42	18.90	7.81	18.30	7.51	17.70	7.21	16.50	6.63
	-11.8	-13	21.30	8.57	20.10	7.97	18.90	7.40	18.30	7.13	17.70	6.85	16.50	6.33
	-9.8	-11	21.30	8.09	20.10	7.54	18.90	7.01	18.30	6.74	17.70	6.48	16.50	5.98
	-9.5	-10	21.30	7.87	20.10	7.33	18.90	6.81	18.30	6.56	17.70	6.30	16.50	5.81
	-8.5	-9.1	21.30	7.66	20.10	7.15	18.90	6.64	18.30	6.39	17.70	6.15	16.50	5.67
	-7	-7.6	21.30	7.32	20.10	6.84	18.90	6.35	18.30	6.13	17.70	5.89	16.50	5.45
	-5	-5.6	21.30	6.90	20.10	6.44	18.90	6.00	18.30	5.78	17.70	5.56	16.50	5.15
	-3	-3.7	21.30	6.51	20.10	6.09	18.90	5.67	18.30	5.47	17.70	5.27	16.50	4.87
	0	-0.7	21.30	5.95	20.10	5.57	18.90	5.20	18.30	5.02	17.70	4.83	16.50	4.48
	3	2.2	21.30	5.46	20.10	5.12	18.90	4.78	18.30	4.61	17.70	4.46	16.50	4.13
	5	4.1	21.30	5.16	20.10	4.84	18.90	4.53	18.30	4.38	17.70	4.22	16.50	3.92
	7	6	21.30	4.88	20.10	4.59	18.90	4.29	18.30	4.15	17.70	4.01	16.50	3.73
	9	7.9	21.30	4.62	20.10	4.35	18.90	4.07	18.30	3.94	17.70	3.80	16.50	3.55
	11	9.8	21.30	4.39	20.10	4.13	18.90	3.87	18.30	3.75	17.70	3.62	16.50	3.38
	13	11.8	21.30	4.15	20.10	3.91	18.90	3.68	18.30	3.56	17.70	3.44	16.50	3.21
	15	13.7	21.30	3.95	20.10	3.72	18.90	3.50	18.30	3.39	17.70	3.28	16.50	3.06
50%	-19.8	-20	17.74	8.16	16.75	7.60	15.75	7.06	15.15	6.80	14.65	6.53	13.66	6.02
	-18.8	-19	17.74	7.98	16.75	7.44	15.75	6.92	15.15	6.65	14.65	6.39	13.66	5.90
	-16.7	-17	17.74	7.62	16.75	7.11	15.75	6.61	15.15	6.36	14.65	6.13	13.66	5.65
	-13.7	-15	17.74	7.25	16.75	6.77	15.75	6.29	15.15	6.07	14.65	5.84	13.66	5.40
	-11.8	-13	17.74	6.89	16.75	6.43	15.75	5.99	15.15	5.77	14.65	5.55	13.66	5.14
	-9.8	-11	17.74	6.52	16.75	6.10	15.75	5.68	15.15	5.47	14.65	5.28	13.66	4.88
	-9.5	-10	17.74	6.34	16.75	5.93	15.75	5.53	15.15	5.34	14.65	5.14	13.66	4.75
	-8.5	-9.1	17.74	6.19	16.75	5.79	15.75	5.40	15.15	5.21	14.65	5.02	13.66	4.64
	-7	-7.6	17.74	5.93	16.75	5.55	15.75	5.18	15.15	5.00	14.65	4.82	13.66	4.47
	-5	-5.6	17.74	5.59	16.75	5.25	15.75	4.90	15.15	4.73	14.65	4.57	13.66	4.23
	-3	-3.7	17.74	5.30	16.75	4.97	15.75	4.64	15.15	4.49	14.65	4.33	13.66	4.02
	0	-0.7	17.74	4.86	16.75	4.57	15.75	4.28	15.15	4.13	14.65	3.99	13.66	3.72
	3	2.2	17.74	4.48	16.75	4.21	15.75	3.94	15.15	3.81	14.65	3.69	13.66	3.44
	5	4.1	17.74	4.25	16.75	3.99	15.75	3.75	15.15	3.63	14.65	3.51	13.66	3.27
	7	6	17.74	4.03	16.75	3.79	15.75	3.57	15.15	3.45	14.65	3.34	13.66	3.12
	9	7.9	17.74	3.82	16.75	3.61	15.75	3.39	15.15	3.29	14.65	3.18	13.66	2.97
	11	9.8	17.74	3.64	16.75	3.43	15.75	3.23	15.15	3.13	14.65	3.03	13.66	2.84
	13	11.8	17.74	3.46	16.75	3.26	15.75	3.07	15.15	2.98	14.65	2.89	13.66	2.71
	15	13.7	17.74	3.29	16.75	3.11	15.75	2.94	15.15	2.85	14.65	2.76	13.66	2.59

Note:

1,  is shown as reference

2, In cooling mode, avoid the outdoor air temperature range from 42-48 degree C, when selecting the models

In heating mode, avoid the outdoor air temperature range from -15 to -20 degree C, when selecting the models

3, The above table shows the average value of conditions may operate

4, It is recommended to connect less than 130%

12HP cooling mode

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(° C DB/WD)													
		DB:20.8,WB:14		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
130%	-5	29.43	3.70	35.05	4.52	40.68	4.84	42.23	5.04	44.26	5.18	45.34	5.63	46.48	5.67
	-2	29.43	3.70	35.05	4.60	40.68	4.84	42.23	5.07	44.26	5.18	45.34	5.70	46.48	5.72
	0	29.43	3.76	35.05	4.68	40.68	5.02	42.23	5.34	44.26	5.48	45.34	5.77	46.48	5.80
	2	29.43	3.83	35.05	4.69	40.68	5.19	42.23	5.65	44.26	5.54	45.34	5.82	46.48	5.89
	4	29.43	3.92	35.05	4.78	40.68	5.37	42.23	5.67	44.26	5.62	45.34	5.81	46.48	6.00
	6	29.43	3.99	35.05	4.88	40.68	5.57	42.23	5.72	43.77	5.79	44.79	5.81	45.97	6.04
	8	29.43	4.09	35.05	4.99	40.68	5.85	42.23	6.00	43.23	5.98	44.30	3.90	45.39	6.10
	10	29.43	4.17	35.05	5.10	40.68	6.06	42.23	6.20	42.71	4.04	43.79	4.06	44.86	6.28
	12	29.43	4.24	35.05	5.20	40.68	6.18	41.63	4.03	42.23	4.06	43.19	4.07	44.27	6.32
	14	29.43	4.33	35.05	5.29	40.56	4.05	41.16	4.06	41.63	4.08	42.71	4.09	43.79	6.46
	16	29.43	4.40	35.05	5.40	40.08	4.06	40.56	4.08	41.04	4.10	42.11	4.12	43.19	6.56
	18	29.43	4.49	35.05	5.51	39.48	6.46	39.96	6.50	40.56	6.54	41.63	6.60	42.71	6.66
	20	29.43	4.59	35.05	5.87	38.88	6.78	39.48	6.82	39.96	6.86	41.04	6.92	42.11	6.99
	21	29.43	4.71	35.05	6.07	38.64	6.94	39.24	6.98	39.72	7.01	40.80	7.09	41.87	7.15
	23	29.43	5.05	35.05	6.51	38.16	7.26	38.64	7.29	39.12	7.33	40.20	7.40	41.27	7.48
	25	29.43	5.39	35.05	6.98	37.57	7.57	38.04	7.61	38.64	7.66	39.72	7.73	40.80	7.81
	27	29.43	5.76	35.05	7.47	37.09	7.89	37.57	7.94	38.04	7.98	39.12	8.06	40.20	8.15
	29	29.43	6.15	35.05	7.98	36.49	8.21	36.97	8.26	37.57	8.31	38.64	8.39	39.72	8.48
	31	29.43	6.56	34.94	8.44	35.89	8.54	36.49	8.59	36.97	8.62	38.04	8.72	39.12	8.82
	33	29.43	6.99	34.33	8.76	35.41	8.86	35.89	8.90	36.49	8.95	37.57	9.05	38.52	9.15
	35	29.43	7.45	33.74	9.07	34.81	9.18	35.41	9.23	35.89	9.28	36.97	9.39	38.04	9.49
	37	29.43	7.93	33.26	9.40	34.34	9.51	34.81	9.56	35.41	9.62	36.37	9.73	37.45	9.84
	39	29.43	8.44	32.66	9.50	33.74	9.83	34.34	9.89	34.81	9.95	35.89	10.06	36.97	10.18
	41	29.43	8.88	32.32	9.59	33.38	9.92	33.98	9.98	34.46	10.05	35.54	10.08	35.55	10.28
	43	29.43	9.11	32.09	9.64	33.21	9.95	33.81	10.03	34.11	10.06	34.89	10.10	35.13	10.30
	45	29.43	9.56	31.89	9.73	32.85	10.04	33.45	10.10	33.61	10.11	33.94	10.14	34.44	10.49
	48	29.43	7.74	33.02	7.46	35.82	7.74	36.48	7.67	36.77	7.71	36.61	7.70	37.28	8.32
120%	-5	27.16	3.57	32.30	4.33	37.57	5.12	40.20	5.58	42.11	5.82	43.07	6.00	44.03	6.16
	-2	27.16	3.61	32.30	4.37	37.57	5.17	40.20	5.61	42.11	5.89	43.07	6.05	44.03	6.18
	0	27.16	3.64	32.30	4.40	37.57	5.23	40.20	5.63	42.11	5.94	43.07	6.09	44.03	6.20
	2	27.16	3.65	32.30	4.45	37.57	5.26	40.20	5.68	42.11	5.96	43.07	6.14	44.03	6.21
	4	27.16	3.69	32.30	4.51	37.57	5.34	40.20	5.73	42.11	6.04	43.07	6.15	44.03	6.23
	6	27.16	3.73	32.30	4.54	37.57	5.40	40.20	5.80	42.11	6.11	43.07	6.20	44.03	6.25
	8	27.16	3.76	32.30	4.59	37.57	5.48	40.20	5.87	42.11	6.17	43.07	6.22	44.03	6.28
	10	27.16	3.81	32.30	4.65	37.57	5.53	40.20	5.98	42.11	6.17	43.07	6.24	44.03	6.30
	12	27.16	3.88	32.30	4.73	37.57	5.63	40.20	6.09	41.52	6.20	42.47	6.20	43.43	6.34
	14	27.16	3.95	32.30	4.83	37.57	5.74	40.20	6.21	40.92	6.24	41.99	6.30	42.95	6.42
	16	27.16	4.02	32.30	4.93	37.57	5.85	39.96	4.10	40.44	6.33	41.40	6.40	42.35	6.52
	18	27.16	4.10	32.30	5.03	37.57	6.05	39.36	6.46	39.84	6.49	40.80	6.55	41.87	6.61
	20	27.16	4.18	32.30	5.22	37.57	6.51	38.88	6.78	39.36	6.81	40.32	6.87	41.28	6.93
	21	27.16	4.22	32.30	5.40	37.57	6.75	38.52	6.94	39.00	6.96	40.08	7.03	41.04	7.10
	23	27.16	4.51	32.30	5.79	37.57	7.22	38.05	7.25	38.52	7.28	39.48	7.36	40.44	7.42
	25	27.16	4.82	32.30	6.20	36.97	7.54	37.45	7.56	37.93	7.60	39.00	7.67	39.96	7.74
	27	27.16	5.15	32.30	6.62	36.49	7.84	36.97	7.89	37.45	7.93	38.40	8.00	39.36	8.07
	29	27.16	5.49	32.30	7.07	35.89	8.16	36.37	8.21	36.85	8.24	37.81	8.33	38.88	8.40
	31	27.16	5.85	32.30	7.55	35.29	8.49	35.89	8.53	36.37	8.57	37.33	8.66	38.28	8.75
	33	27.16	6.23	32.30	8.05	34.81	8.81	35.29	8.85	35.77	8.89	36.73	8.99	37.69	9.07
	35	27.16	6.64	32.30	8.59	34.22	9.12	34.70	9.17	35.29	9.22	36.25	9.32	37.21	9.42
	37	27.16	7.06	32.30	9.15	33.74	9.45	34.22	9.50	34.70	9.55	35.65	9.65	36.61	9.76
	39	27.16	7.51	32.18	9.66	33.14	9.77	33.62	9.83	34.10	9.88	35.17	9.99	36.13	10.09
	41	27.16	7.72	31.92	9.73	32.88	9.84	33.36	9.90	33.84	9.95	34.91	10.02	35.09	10.16
	43	27.16	7.83	31.75	9.80	32.62	9.90	33.10	9.94	33.58	9.98	34.31	10.04	34.55	10.37
	45	27.16	7.93	31.58	9.89	32.31	9.99	32.75	10.03	33.28	10.06	33.61	10.08	34.20	10.59
	48	31.47	5.16	36.28	6.42	36.95	6.50	37.34	6.57	38.14	6.56	38.34	6.47	39.10	6.87
110%	-5	24.89	3.12	29.67	3.88	34.46	4.64	36.85	4.97	39.24	5.35	42.24	5.56	43.19	5.73
	-2	24.89	3.18	29.67	3.93	34.46	4.67	36.85	5.03	39.24	5.39	42.24	5.61	43.19	5.76
	0	24.89	3.21	29.67	3.96	34.46	4.71	36.85	5.06	39.24	5.46	42.24	5.67	43.19	5.83

	2	24.89	3.28	29.67	3.99	34.46	4.78	36.85	5.11	39.24	5.51	42.24	5.75	43.19	5.90
	4	24.89	3.35	29.67	4.04	34.46	4.83	36.85	5.18	39.24	5.60	42.24	5.83	43.19	5.96
	6	24.89	3.38	29.67	4.09	34.46	4.88	36.85	5.26	39.24	5.66	42.24	5.89	43.19	6.05
	8	24.89	3.41	29.67	4.15	34.46	4.93	36.85	5.31	39.24	5.72	42.24	5.93	43.19	6.11
	10	24.89	3.45	29.67	4.21	34.46	5.00	36.85	5.40	39.24	5.82	42.24	5.97	43.19	6.17
	12	24.89	3.53	29.67	4.29	34.46	5.10	36.85	5.51	39.24	5.93	41.76	6.06	42.59	6.25
	14	24.89	3.59	29.67	4.37	34.46	5.20	36.85	5.61	39.24	6.04	41.16	6.11	42.12	6.29
	16	24.89	3.65	29.67	4.45	34.46	5.29	36.85	5.72	39.24	6.16	40.68	6.18	41.52	6.36
	18	24.89	3.72	29.67	4.54	34.46	5.40	36.85	5.88	39.24	6.45	40.08	6.50	41.04	6.56
	20	24.89	3.79	29.67	4.64	34.46	5.72	36.85	6.32	38.65	6.77	39.60	6.82	40.44	6.88
	21	24.89	3.83	29.67	4.77	34.46	5.93	36.85	6.55	38.41	6.93	39.25	6.98	40.20	7.04
	23	24.89	4.01	29.67	5.11	34.46	6.36	36.85	7.03	37.81	7.23	38.77	7.30	39.60	7.37
	25	24.89	4.28	29.67	5.46	34.46	6.79	36.85	7.53	37.33	7.55	38.17	7.62	39.12	7.68
	27	24.89	4.56	29.67	5.84	34.46	7.27	36.25	7.84	36.73	7.87	37.69	7.94	38.53	8.01
	29	24.89	4.87	29.67	6.23	34.46	7.77	35.77	8.16	36.25	8.20	37.09	8.27	38.05	8.34
	31	24.89	5.18	29.67	6.65	34.46	8.29	35.18	8.48	35.65	8.51	36.61	8.59	37.45	8.67
	33	24.89	5.51	29.67	7.09	34.22	8.75	34.70	8.79	35.18	8.83	36.01	8.92	36.97	9.00
	35	24.89	5.87	29.67	7.55	33.62	9.06	34.10	9.11	34.58	9.16	35.42	9.25	36.37	9.33
	37	24.89	6.25	29.67	8.04	33.14	9.39	33.62	9.43	33.98	9.48	34.94	9.58	35.77	9.66
	39	24.89	6.64	29.67	8.56	32.54	9.71	33.02	9.76	33.50	9.81	34.34	9.90	35.30	10.00
100%	41	24.89	6.70	29.67	8.63	32.29	9.78	32.77	9.83	33.25	9.88	33.90	9.97	34.23	10.07
	43	24.89	6.77	29.67	8.74	32.03	9.85	32.51	9.90	32.99	9.94	33.60	10.01	33.71	10.28
	45	24.89	6.99	29.67	8.79	31.71	9.94	32.17	10.01	32.70	10.03	33.26	10.28	33.39	10.51
	48	27.25	5.17	32.50	6.44	34.22	7.27	34.67	7.38	35.40	7.34	35.82	7.98	36.10	7.70
	-5	22.61	2.84	26.92	3.42	31.35	4.07	33.50	4.36	35.65	4.73	40.08	5.39	42.35	5.63
	-2	22.61	2.88	26.92	3.47	31.35	4.12	33.50	4.44	35.65	4.80	40.08	5.46	42.35	5.67
	0	22.61	2.91	26.92	3.50	31.35	4.16	33.50	4.50	35.65	4.84	40.08	5.55	42.35	5.73
	2	22.61	2.96	26.92	3.55	31.35	4.21	33.50	4.56	35.65	4.90	40.08	5.63	42.35	5.82
	4	22.61	2.98	26.92	3.58	31.35	4.27	33.50	4.62	35.65	4.96	40.08	5.68	42.35	5.88
	6	22.61	3.03	26.92	3.66	31.35	4.33	33.50	4.71	35.65	5.03	40.08	5.76	42.35	5.97
	8	22.61	3.09	26.92	3.71	31.35	4.41	33.50	4.76	35.65	5.11	40.08	5.86	42.35	6.07
	10	22.61	3.12	26.92	3.78	31.35	4.48	33.50	4.84	35.65	5.21	40.08	5.95	42.35	6.16
	12	22.61	3.17	26.92	3.85	31.35	4.56	33.50	4.93	35.65	5.31	40.08	6.06	41.75	6.21
	14	22.61	3.23	26.92	3.93	31.35	4.65	33.50	5.03	35.65	5.40	40.08	6.18	41.28	6.28
	16	22.61	3.29	26.92	4.00	31.35	4.74	33.50	5.12	35.65	5.51	39.84	6.26	40.68	6.35
	18	22.61	3.35	26.92	4.07	31.35	4.83	33.50	5.22	35.65	5.62	39.36	6.46	40.20	6.51
	20	22.61	3.42	26.92	4.16	31.35	4.98	33.50	5.49	35.65	6.03	38.76	6.77	39.60	6.83
	21	22.61	3.45	26.92	4.20	31.35	5.16	33.50	5.68	35.65	6.23	38.53	6.93	39.36	6.99
	23	22.61	3.54	26.92	4.48	31.35	5.53	33.50	6.09	35.65	6.68	38.05	7.24	38.76	7.31
	25	22.61	3.77	26.92	4.78	31.35	5.92	33.50	6.53	35.65	7.16	37.45	7.56	38.28	7.62
90%	27	22.61	4.02	26.92	5.10	31.35	6.32	33.50	6.98	35.65	7.66	36.85	7.88	37.69	7.95
	29	22.61	4.28	26.92	5.44	31.35	6.74	33.50	7.45	35.53	8.14	36.37	8.21	37.21	8.27
	31	22.61	4.56	26.92	5.81	31.35	7.20	33.50	7.95	35.05	8.45	35.77	8.53	36.61	8.60
	33	22.61	4.84	26.92	6.18	31.35	7.67	33.50	8.49	34.46	8.77	35.30	8.84	36.13	8.93
	35	22.61	5.15	26.92	6.57	31.35	8.18	33.50	9.05	33.86	9.09	34.70	9.17	35.53	9.25
	37	22.61	5.48	26.92	7.00	31.35	8.72	32.90	9.37	33.38	9.42	34.22	9.50	34.94	9.57
	39	22.61	5.82	26.92	7.44	31.35	9.28	32.42	9.68	32.78	9.73	33.62	9.82	34.46	9.92
	41	22.61	6.09	26.92	7.71	31.35	9.62	31.92	9.75	32.53	9.88	33.04	10.05	33.96	10.12
	43	22.61	6.36	26.92	7.98	31.35	9.80	31.42	9.87	32.29	9.98	33.23	10.12	33.36	10.23
	45	22.61	6.72	26.92	8.35	31.35	9.97	30.75	10.00	32.13	10.16	32.95	10.27	32.69	10.37
	48	23.42	7.06	27.88	8.64	32.47	9.98	30.53	9.85	33.22	10.27	32.05	10.24	33.11	10.34
	-5	20.34	2.51	24.29	3.02	28.24	3.56	30.15	3.88	32.06	4.13	36.01	4.75	39.96	5.44
	-2	20.34	2.54	24.29	3.05	28.24	3.60	30.15	3.94	32.06	4.18	36.01	4.79	39.96	5.49
	0	20.34	2.57	24.29	3.09	28.24	3.66	30.15	3.98	32.06	4.23	36.01	4.85	39.96	5.53
	2	20.34	2.61	24.29	3.12	28.24	3.70	30.15	4.04	32.06	4.30	36.01	4.95	39.96	5.61
	4	20.34	2.65	24.29	3.17	28.24	3.76	30.15	4.10	32.06	4.35	36.01	5.03	39.96	5.70
	6	20.34	2.69	24.29	3.23	28.24	3.83	30.15	4.18	32.06	4.43	36.01	5.10	39.96	5.79
	8	20.34	2.74	24.29	3.29	28.24	3.91	30.15	4.23	32.06	4.51	36.01	5.20	39.96	5.85
	10	20.34	2.79	24.29	3.37	28.24	3.98	30.15	4.29	32.06	4.61	36.01	5.27	39.96	5.94
	12	20.34	2.84	24.29	3.43	28.24	4.05	30.15	4.36	32.06	4.70	36.01	5.37	39.96	6.05
	14	20.34	2.89	24.29	3.49	28.24	4.12	30.15	4.45	32.06	4.78	36.01	5.46	39.96	6.16
	16	20.34	2.94	24.29	3.55	28.24	4.21	30.15	4.54	32.06	4.88	36.01	5.57	39.84	6.27
	18	20.34	2.99	24.29	3.62	28.24	4.28	30.15	4.62	32.06	4.98	36.01	5.68	39.36	6.46
	20	20.34	3.05	24.29	3.71	28.24	4.37	30.15	4.72	32.06	5.16	36.01	6.11	38.76	6.77

	21	20.34	3.07	24.29	3.73	28.24	4.44	30.15	4.88	32.06	5.34	36.01	6.33	38.53	6.93
	23	20.34	3.13	24.29	3.88	28.24	4.76	30.15	5.23	32.06	5.73	36.01	6.79	37.93	7.24
	25	20.34	3.30	24.29	4.15	28.24	5.09	30.15	5.60	32.06	6.12	36.01	7.27	37.45	7.56
	27	20.34	3.51	24.29	4.42	28.24	5.43	30.15	5.98	32.06	6.55	36.01	7.78	36.85	7.88
	29	20.34	3.74	24.29	4.71	28.24	5.79	30.15	6.38	32.06	7.00	35.65	8.14	36.37	8.20
	31	20.34	3.98	24.29	5.01	28.24	6.17	30.15	6.81	32.06	7.46	35.06	8.45	35.77	8.52
	33	20.34	4.22	24.29	5.33	28.24	6.59	30.15	7.26	32.06	7.96	34.58	8.78	35.29	8.84
	35	20.34	4.49	24.29	5.67	28.24	7.01	30.15	7.73	32.06	8.49	33.98	9.10	34.70	9.17
	37	20.34	4.76	24.29	6.03	28.24	7.46	30.15	8.23	32.06	9.05	33.38	9.42	34.22	9.49
	39	20.34	5.05	24.29	6.42	28.24	7.94	30.15	8.77	32.06	9.64	32.90	9.75	33.62	9.82
	41	20.34	5.22	24.29	6.71	28.24	8.23	30.15	9.00	32.06	9.69	32.67	9.99	33.39	10.05
	43	20.34	5.47	24.29	7.00	28.24	8.52	30.15	9.23	32.06	9.90	32.51	10.12	33.11	10.21
	45	20.34	5.82	24.29	7.34	28.24	8.87	30.15	9.54	32.06	10.17	32.32	10.23	32.60	10.34
	48	20.34	4.46	24.29	5.54	28.24	6.62	30.15	7.10	32.06	7.41	35.61	7.38	35.24	7.46
80%	-5	18.07	2.21	21.54	2.62	25.00	3.10	26.80	3.30	28.60	3.55	32.06	4.10	35.53	4.68
	-2	18.07	2.25	21.54	2.65	25.00	3.13	26.80	3.35	28.60	3.58	32.06	4.14	35.53	4.73
	0	18.07	2.29	21.54	2.68	25.00	3.17	26.80	3.39	28.60	3.65	32.06	4.20	35.53	4.79
	2	18.07	2.33	21.54	2.72	25.00	3.21	26.80	3.45	28.60	3.71	32.06	4.29	35.53	4.88
	4	18.07	2.37	21.54	2.77	25.00	3.27	26.80	3.53	28.60	3.78	32.06	4.36	35.53	4.95
	6	18.07	2.41	21.54	2.83	25.00	3.32	26.80	3.61	28.60	3.85	32.06	4.43	35.53	5.03
	8	18.07	2.46	21.54	2.90	25.00	3.40	26.80	3.67	28.60	3.93	32.06	4.49	35.53	5.13
	10	18.07	2.48	21.54	2.96	25.00	3.49	26.80	3.76	28.60	4.03	32.06	4.60	35.53	5.18
	12	18.07	2.51	21.54	3.01	25.00	3.55	26.80	3.83	28.60	4.11	32.06	4.68	35.53	5.28
	14	18.07	2.56	21.54	3.07	25.00	3.61	26.80	3.89	28.60	4.18	32.06	4.77	35.53	5.38
	16	18.07	2.60	21.54	3.12	25.00	3.68	26.80	3.96	28.60	4.26	32.06	4.87	35.53	5.48
	18	18.07	2.65	21.54	3.18	25.00	3.76	26.80	4.05	28.60	4.34	32.06	4.96	35.53	5.59
	20	18.07	2.70	21.54	3.24	25.00	3.83	26.80	4.12	28.60	4.43	32.06	5.15	35.53	5.98
	21	18.07	2.72	21.54	3.27	25.00	3.87	26.80	4.17	28.60	4.53	32.06	5.33	35.53	6.20
	23	18.07	2.77	21.54	3.34	25.00	4.05	26.80	4.44	28.60	4.84	32.06	5.71	35.53	6.65
	25	18.07	2.85	21.54	3.55	25.00	4.33	26.80	4.74	28.60	5.17	32.06	6.11	35.53	7.11
	27	18.07	3.04	21.54	3.78	25.00	4.61	26.80	5.06	28.60	5.53	32.06	6.53	35.53	7.61
	29	18.07	3.23	21.54	4.03	25.00	4.92	26.80	5.39	28.60	5.90	32.06	6.96	35.53	8.14
	31	18.07	3.43	21.54	4.28	25.00	5.23	26.80	5.74	28.60	6.29	32.06	7.44	34.94	8.45
	33	18.07	3.65	21.54	4.55	25.00	5.57	26.80	6.12	28.60	6.70	32.06	7.93	34.46	8.77
	35	18.07	3.87	21.54	4.84	25.00	5.93	26.80	6.51	28.60	7.14	32.06	8.45	33.86	9.09
	37	18.07	4.10	21.54	5.13	25.00	6.31	26.80	6.94	28.60	7.60	32.06	9.01	33.38	9.40
	39	18.07	4.34	21.54	5.48	25.00	6.71	26.80	7.38	28.60	8.09	32.06	9.60	32.78	9.73
	41	18.07	4.44	21.54	5.53	25.00	6.81	26.80	7.57	28.60	8.23	32.06	9.84	32.58	9.90
	43	18.07	4.57	21.54	5.57	25.00	6.90	26.80	7.71	28.60	8.35	32.06	9.96	32.38	10.01
	45	18.07	4.70	21.54	5.64	25.00	7.04	26.80	7.87	28.60	8.49	32.06	10.07	31.98	10.18
	48	18.07	3.08	21.54	3.68	28.13	4.64	26.80	5.23	28.60	5.60	32.06	6.60	35.67	6.75
70%	-5	15.79	1.98	18.90	2.32	21.90	2.63	23.45	2.82	25.00	3.01	28.00	3.44	31.11	3.95
	-2	15.79	1.99	18.90	2.33	21.90	2.64	23.45	2.87	25.00	3.06	28.00	3.49	31.11	4.01
	0	15.79	2.00	18.90	2.36	21.90	2.70	23.45	2.92	25.00	3.11	28.00	3.56	31.11	4.06
	2	15.79	2.01	18.90	2.37	21.90	2.74	23.45	2.98	25.00	3.17	28.00	3.64	31.11	4.13
	4	15.79	2.04	18.90	2.43	21.90	2.80	23.45	3.03	25.00	3.24	28.00	3.70	31.11	4.22
	6	15.79	2.07	18.90	2.47	21.90	2.87	23.45	3.13	25.00	3.31	28.00	3.76	31.11	4.31
	8	15.79	2.11	18.90	2.55	21.90	2.94	23.45	3.18	25.00	3.38	28.00	3.87	31.11	4.39
	10	15.79	2.16	18.90	2.59	21.90	3.01	23.45	3.24	25.00	3.48	28.00	3.95	31.11	4.44
	12	15.79	2.21	18.90	2.62	21.90	3.07	23.45	3.31	25.00	3.54	28.00	4.02	31.11	4.53
	14	15.79	2.24	18.90	2.67	21.90	3.12	23.45	3.35	25.00	3.60	28.00	4.10	31.11	4.61
	16	15.79	2.28	18.90	2.72	21.90	3.18	23.45	3.43	25.00	3.67	28.00	4.17	31.11	4.70
	18	15.79	2.32	18.90	2.77	21.90	3.24	23.45	3.49	25.00	3.73	28.00	4.26	31.11	4.79
	20	15.79	2.35	18.90	2.82	21.90	3.31	23.45	3.55	25.00	3.81	28.00	4.34	31.11	4.93
	21	15.79	2.38	18.90	2.84	21.90	3.33	23.45	3.59	25.00	3.84	28.00	4.40	31.11	5.10
	23	15.79	2.41	18.90	2.89	21.90	3.40	23.45	3.71	25.00	4.04	28.00	4.72	31.11	5.46
	25	15.79	2.46	18.90	3.01	21.90	3.62	23.45	3.96	25.00	4.31	28.00	5.05	31.11	5.84
	27	15.79	2.61	18.90	3.21	21.90	3.87	23.45	4.22	25.00	4.60	28.00	5.39	31.11	6.25
	29	15.79	2.77	18.90	3.40	21.90	4.11	23.45	4.50	25.00	4.89	28.00	5.74	31.11	6.67
	31	15.79	2.93	18.90	3.61	21.90	4.38	23.45	4.78	25.00	5.21	28.00	6.12	31.11	7.11
	33	15.79	3.11	18.90	3.84	21.90	4.66	23.45	5.09	25.00	5.55	28.00	6.53	31.11	7.59
	35	15.79	3.29	18.90	4.07	21.90	4.94	23.45	5.42	25.00	5.90	28.00	6.95	31.11	8.09
	37	15.79	3.48	18.90	4.32	21.90	5.26	23.45	5.74	25.00	6.28	28.00	7.40	31.11	8.61
	39	15.79	3.68	18.90	4.57	21.90	5.57	23.45	6.11	25.00	6.67	28.00	7.87	31.11	9.17

Specification and performance

MCAC-VTSM-2012-09

	41	15.79	3.85	18.90	4.74	21.90	5.74	23.45	6.31	25.00	6.88	28.00	8.19	31.11	9.58
	43	15.79	4.16	18.90	5.06	21.90	5.97	23.45	6.65	25.00	7.08	28.00	8.49	31.11	9.88
	45	15.79	4.25	18.90	5.17	21.90	6.10	23.45	6.76	25.00	7.43	28.00	8.95	31.11	10.26
	48	15.79	7.98	18.90	9.68	21.90	11.41	23.45	12.49	25.00	13.47	28.00	16.25	31.11	18.45
60%	-5	13.52	1.69	16.15	1.96	18.78	2.28	20.10	2.43	21.42	2.62	24.05	2.94	26.68	3.38
	-2	13.52	1.70	16.15	1.99	18.78	2.32	20.10	2.46	21.42	2.65	24.05	2.99	26.68	3.40
	0	13.52	1.72	16.15	2.01	18.78	2.35	20.10	2.49	21.42	2.69	24.05	3.03	26.68	3.44
	2	13.52	1.75	16.15	2.06	18.78	2.39	20.10	2.54	21.42	2.73	24.05	3.09	26.68	3.49
	4	13.52	1.80	16.15	2.10	18.78	2.44	20.10	2.57	21.42	2.77	24.05	3.14	26.68	3.54
	6	13.52	1.82	16.15	2.14	18.78	2.49	20.10	2.63	21.42	2.83	24.05	3.21	26.68	3.62
	8	13.52	1.85	16.15	2.17	18.78	2.53	20.10	2.68	21.42	2.88	24.05	3.27	26.68	3.68
	10	13.52	1.89	16.15	2.22	18.78	2.57	20.10	2.76	21.42	2.94	24.05	3.33	26.68	3.73
	12	13.52	1.93	16.15	2.26	18.78	2.62	20.10	2.81	21.42	2.99	24.05	3.39	26.68	3.79
	14	13.52	1.95	16.15	2.29	18.78	2.66	20.10	2.85	21.42	3.05	24.05	3.45	26.68	3.87
	16	13.52	1.98	16.15	2.33	18.78	2.71	20.10	2.90	21.42	3.10	24.05	3.51	26.68	3.94
	18	13.52	2.01	16.15	2.37	18.78	2.76	20.10	2.95	21.42	3.16	24.05	3.57	26.68	4.01
	20	13.52	2.04	16.15	2.41	18.78	2.81	20.10	3.01	21.42	3.22	24.05	3.65	26.68	4.10
	21	13.52	2.06	16.15	2.43	18.78	2.83	20.10	3.04	21.42	3.24	24.05	3.68	26.68	4.13
	23	13.52	2.09	16.15	2.48	18.78	2.88	20.10	3.10	21.42	3.30	24.05	3.83	26.68	4.40
	25	13.52	2.12	16.15	2.51	18.78	2.99	20.10	3.24	21.42	3.51	24.05	4.09	26.68	4.69
	27	13.52	2.21	16.15	2.67	18.78	3.18	20.10	3.46	21.42	3.74	24.05	4.35	26.68	5.01
	29	13.52	2.33	16.15	2.83	18.78	3.39	20.10	3.68	21.42	3.99	24.05	4.65	26.68	5.35
	31	13.52	2.48	16.15	3.00	18.78	3.60	20.10	3.91	21.42	4.24	24.05	4.94	26.68	5.69
	33	13.52	2.61	16.15	3.18	18.78	3.82	20.10	4.16	21.42	4.51	24.05	5.26	26.68	6.07
	35	13.52	2.77	16.15	3.38	18.78	4.05	20.10	4.41	21.42	4.79	24.05	5.60	26.68	6.46
	37	13.52	2.93	16.15	3.57	18.78	4.29	20.10	4.68	21.42	5.09	24.05	5.95	26.68	6.88
	39	13.52	3.09	16.15	3.78	18.78	4.55	20.10	4.96	21.42	5.40	24.05	6.32	26.68	7.32
	41	13.52	3.18	16.15	3.94	18.78	4.71	20.10	5.16	21.42	5.60	24.05	6.61	26.68	7.65
	43	13.52	3.28	16.15	4.11	18.78	4.88	20.10	5.32	21.42	5.80	24.05	6.90	26.68	7.98
	45	13.52	3.44	16.15	4.32	18.78	5.08	20.10	5.52	21.42	6.08	24.05	7.20	26.68	8.42
	48	13.52	4.82	16.15	6.00	18.78	6.95	20.10	7.61	21.42	8.53	24.05	9.87	26.68	11.82
50%	-5	11.31	1.46	13.52	1.69	15.67	1.95	16.75	2.04	17.83	2.15	19.98	2.44	22.25	2.63
	-2	11.31	1.48	13.52	1.73	15.67	1.97	16.75	2.06	17.83	2.19	19.98	2.48	22.25	2.67
	0	11.31	1.50	13.52	1.76	15.67	2.00	16.75	2.09	17.83	2.21	19.98	2.52	22.25	2.72
	2	11.31	1.52	13.52	1.78	15.67	2.04	16.75	2.12	17.83	2.25	19.98	2.53	22.25	2.77
	4	11.31	1.54	13.52	1.81	15.67	2.06	16.75	2.15	17.83	2.30	19.98	2.59	22.25	2.84
	6	11.31	1.56	13.52	1.84	15.67	2.09	16.75	2.20	17.83	2.34	19.98	2.63	22.25	2.92
	8	11.31	1.60	13.52	1.87	15.67	2.13	16.75	2.25	17.83	2.37	19.98	2.67	22.25	3.02
	10	11.31	1.63	13.52	1.89	15.67	2.16	16.75	2.28	17.83	2.44	19.98	2.74	22.25	3.06
	12	11.31	1.65	13.52	1.91	15.67	2.20	16.75	2.33	17.83	2.49	19.98	2.79	22.25	3.11
	14	11.31	1.67	13.52	1.94	15.67	2.22	16.75	2.38	17.83	2.52	19.98	2.84	22.25	3.17
	16	11.31	1.70	13.52	1.96	15.67	2.26	16.75	2.41	17.83	2.56	19.98	2.89	22.25	3.22
	18	11.31	1.72	13.52	2.00	15.67	2.29	16.75	2.45	17.83	2.61	19.98	2.94	22.25	3.28
	20	11.31	1.74	13.52	2.02	15.67	2.33	16.75	2.49	17.83	2.66	19.98	2.99	22.25	3.34
	21	11.31	1.76	13.52	2.05	15.67	2.35	16.75	2.51	17.83	2.68	19.98	3.02	22.25	3.38
	23	11.31	1.78	13.52	2.07	15.67	2.39	16.75	2.56	17.83	2.73	19.98	3.07	22.25	3.45
	25	11.31	1.80	13.52	2.11	15.67	2.44	16.75	2.61	17.83	2.82	19.98	3.23	22.25	3.68
	27	11.31	1.84	13.52	2.20	15.67	2.57	16.75	2.78	17.83	2.99	19.98	3.44	22.25	3.93
	29	11.31	1.94	13.52	2.32	15.67	2.73	16.75	2.95	17.83	3.18	19.98	3.66	22.25	4.18
	31	11.31	2.05	13.52	2.45	15.67	2.89	16.75	3.13	17.83	3.38	19.98	3.89	22.25	4.45
	33	11.31	2.17	13.52	2.60	15.67	3.07	16.75	3.32	17.83	3.59	19.98	4.13	22.25	4.73
	35	11.31	2.29	13.52	2.74	15.67	3.24	16.75	3.51	17.83	3.79	19.98	4.39	22.25	5.02
	37	11.31	2.41	13.52	2.90	15.67	3.44	16.75	3.72	17.83	4.02	19.98	4.66	22.25	5.34
	39	11.31	2.55	13.52	3.06	15.67	3.63	16.75	3.94	17.83	4.27	19.98	4.94	22.25	5.67
	41	11.31	2.65	13.52	3.19	15.67	3.77	16.75	4.12	17.83	4.45	19.98	5.20	22.25	5.93
	43	11.31	2.83	13.52	3.41	15.67	3.90	16.75	4.31	17.83	4.57	19.98	5.47	22.25	6.20
	45	11.31	2.89	13.52	3.50	15.67	4.16	16.75	4.64	17.83	4.76	19.98	5.99	22.25	6.72
	48	11.31	3.07	13.52	3.74	15.67	4.31	16.75	4.82	17.83	4.87	19.98	6.30	22.25	7.03


12HP heating mode

Combination (Capacity index)	Outdoor air temp.		Indoor temperature(°C DB)											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-19.8	-20	24.28	6.35	24.16	6.80	24.05	7.25	24.05	7.47	23.93	7.69	23.93	8.15
	-18.8	-19	24.64	6.49	24.52	6.94	24.52	7.38	24.40	7.60	24.40	7.81	24.28	8.25
	-16.7	-17	25.59	6.80	25.47	7.22	25.35	7.65	25.35	7.86	25.35	8.07	25.24	8.49
	-13.7	-15	26.66	7.11	26.55	7.52	26.43	7.93	26.43	8.13	26.31	8.34	26.31	8.75
	-11.8	-13	27.74	7.43	27.74	7.82	27.62	8.21	27.50	8.41	27.50	8.60	27.38	8.99
	-9.8	-11	29.05	7.75	28.93	8.13	28.81	8.50	28.81	8.69	28.81	8.87	28.69	9.25
	-9.5	-10	29.76	7.92	29.64	8.28	29.52	8.64	29.52	8.83	29.40	9.00	29.40	9.36
	-8.5	-9.1	30.35	8.06	30.24	8.41	30.24	8.77	30.12	8.94	30.12	9.12	30.00	9.48
	-7	-7.6	31.43	8.29	31.43	8.64	31.31	8.98	31.31	9.15	31.19	9.32	31.07	9.67
	-5	-5.6	33.09	8.60	32.97	8.93	32.85	9.26	32.85	9.42	32.74	9.57	32.74	9.90
	-3	-3.7	34.64	8.88	34.52	9.20	34.52	9.50	34.40	9.67	34.40	9.82	34.28	10.12
	0	-0.7	37.38	9.32	37.38	9.61	37.26	9.89	37.26	9.99	37.14	10.18	37.14	10.46
	3	2.2	40.35	9.70	40.24	9.97	40.12	10.24	40.12	10.37	40.12	10.51	40.00	10.76
	5	4.1	42.38	9.95	42.26	10.20	42.26	10.45	42.14	10.58	42.14	10.71	42.02	10.95
	7	6	44.52	10.18	44.40	10.41	44.40	10.66	44.28	10.78	44.28	10.89	42.50	10.46
	9	7.9	46.78	10.39	46.66	10.62	46.66	10.85	46.55	10.96	45.59	10.73	42.50	9.83
	11	9.8	49.16	10.60	49.05	10.81	48.81	10.95	47.14	10.52	45.59	10.09	42.50	9.26
	13	11.8	51.78	10.80	51.66	11.01	48.81	10.26	47.14	9.85	45.59	9.47	42.50	8.69
	15	13.7	54.28	10.99	51.90	10.43	48.81	9.67	47.14	9.29	45.59	8.92	42.50	8.20
120%	-19.8	-20	24.17	6.96	24.05	7.37	23.93	7.79	23.93	7.99	23.93	8.20	23.81	8.62
	-18.8	-19	24.53	7.09	24.41	7.50	24.41	7.90	24.29	8.10	24.29	8.31	24.17	8.72
	-16.7	-17	25.48	7.37	25.36	7.76	25.20	8.15	25.24	8.35	25.24	8.55	25.12	8.93
	-13.7	-15	26.55	7.66	26.43	8.03	26.31	8.41	26.31	8.61	26.31	8.79	26.19	9.17
	-11.8	-13	27.62	7.95	27.62	8.31	27.50	8.68	27.50	8.86	27.38	9.04	27.38	9.40
	-9.8	-11	28.93	8.25	28.81	8.59	28.81	8.94	28.69	9.12	28.69	9.28	28.57	9.63
	-9.5	-10	29.65	8.41	29.53	8.75	29.41	9.07	29.41	9.25	29.41	9.41	29.29	9.75
	-8.5	-9.1	30.24	8.53	30.12	8.86	30.12	9.19	30.00	9.35	30.00	9.53	29.88	9.85
	-7	-7.6	31.31	8.76	31.31	9.07	31.19	9.39	31.19	9.55	31.07	9.70	31.07	10.02
	-5	-5.6	32.98	9.04	32.86	9.34	32.74	9.64	32.74	9.80	32.74	9.95	32.62	10.24
	-3	-3.7	34.53	9.31	34.53	9.60	34.41	9.88	34.41	10.02	34.29	10.17	34.29	10.45
	0	-0.7	37.26	9.70	37.26	9.97	37.14	10.23	37.14	10.37	37.02	10.50	37.02	10.76
	3	2.2	40.24	10.06	40.12	10.31	40.12	10.55	40.00	10.68	40.00	10.80	39.17	10.74
	5	4.1	42.26	10.29	42.14	10.52	42.14	10.75	42.02	10.87	42.02	10.99	39.17	10.09
	7	6	44.41	10.50	44.41	10.72	44.29	10.94	43.57	10.79	42.14	10.34	39.17	9.49
	9	7.9	46.67	10.71	46.55	10.92	45.00	10.55	43.57	10.14	42.14	9.73	39.17	8.93
	11	9.8	49.05	10.89	47.86	10.71	45.00	9.92	43.57	9.54	42.14	9.15	39.17	8.42
	13	11.8	50.83	10.79	47.86	10.04	45.00	9.31	43.57	8.96	42.14	8.61	39.17	7.92
	15	13.7	50.83	10.16	47.86	9.46	45.00	8.78	43.57	8.44	42.14	8.11	39.17	7.47
110%	-19.8	-20	24.05	7.57	23.93	7.94	23.81	8.32	23.81	8.51	23.82	8.70	23.69	9.08
	-18.8	-19	24.41	7.68	24.29	8.06	24.29	8.43	24.29	8.62	24.17	8.80	24.17	9.18
	-16.7	-17	25.36	7.94	25.24	8.30	25.59	8.66	25.12	8.84	25.12	9.03	25.00	9.38
	-13.7	-15	26.43	8.21	26.31	8.56	26.19	8.90	26.19	9.07	26.19	9.25	26.07	9.59
	-11.8	-13	27.50	8.49	27.50	8.81	27.38	9.14	27.38	9.31	27.26	9.47	27.26	9.81
	-9.8	-11	28.81	8.76	28.69	9.07	28.69	9.39	28.57	9.55	28.57	9.70	28.57	10.02
	-9.5	-10	29.52	8.90	29.40	9.20	29.28	9.52	29.28	9.67	29.28	9.82	29.17	10.12
	-8.5	-9.1	30.12	9.01	30.00	9.32	30.00	9.62	29.88	9.77	29.88	9.92	29.88	9.05
	-7	-7.6	31.19	9.22	31.19	9.50	31.07	9.80	31.07	9.95	31.07	10.09	30.95	10.38
	-5	-5.6	32.86	9.48	32.74	9.76	32.62	10.03	32.62	10.17	32.62	10.31	32.50	10.59
	-3	-3.7	34.41	9.73	34.41	9.98	34.29	10.25	34.29	10.38	34.17	10.51	34.17	10.78
	0	-0.7	37.14	10.09	37.14	10.33	37.03	10.58	37.03	10.69	37.03	10.82	35.95	10.61
	3	2.2	40.12	10.43	40.00	10.65	40.00	10.87	39.88	10.98	38.57	10.53	35.95	9.66
	5	4.1	42.14	10.62	42.14	10.85	41.31	10.74	39.88	10.31	38.57	9.90	35.95	9.08
	7	6	44.28	10.82	43.93	10.89	41.31	10.09	39.88	9.69	38.57	9.31	35.95	8.55
	9	7.9	46.55	11.00	43.93	10.24	41.31	9.49	39.88	9.12	38.57	8.76	35.95	8.06
	11	9.8	46.55	10.34	43.93	9.63	41.31	8.93	39.88	8.59	38.57	8.25	35.95	7.60
	13	11.8	46.55	9.70	43.93	9.04	41.31	8.39	39.88	8.08	38.57	7.76	35.95	7.16
	15	13.7	46.55	8.62	43.93	8.52	41.31	7.93	39.88	7.62	38.57	7.34	35.95	6.77

100%	-19.8	-20	23.93	8.17	23.81	8.51	23.81	8.86	23.69	9.04	23.69	9.20	23.57	9.55
	-18.8	-19	24.29	8.28	24.29	8.62	24.17	8.95	24.17	9.13	24.05	9.31	24.05	9.64
	-16.7	-17	25.24	8.51	25.12	8.84	25.12	9.17	25.00	9.33	25.00	9.49	25.00	9.82
	-13.7	-15	26.31	8.76	26.19	9.07	26.07	9.39	26.07	9.55	26.07	9.70	25.95	10.02
	-11.8	-13	27.38	9.01	27.38	9.31	27.26	9.61	27.26	9.76	27.26	9.91	27.14	10.22
	-9.8	-11	28.69	9.26	28.57	9.55	28.57	9.83	28.57	9.98	28.45	10.12	28.45	10.40
	-9.5	-10	29.40	9.39	29.29	9.67	29.29	9.95	29.17	10.09	29.17	10.23	29.05	10.51
	-8.5	-9.1	30.00	9.49	29.88	9.77	29.88	10.04	29.88	10.18	29.76	10.32	29.76	10.59
	-7	-7.6	31.07	9.68	31.07	9.95	30.95	10.20	30.95	10.34	30.95	10.47	30.83	10.74
	-5	-5.6	32.74	9.92	32.62	10.17	32.62	10.43	32.50	10.54	32.50	10.67	32.38	10.93
	-3	-3.7	34.29	10.15	34.29	9.21	34.17	10.62	34.17	10.74	34.17	10.86	32.74	10.40
	0	-0.7	37.02	10.47	37.02	10.69	36.90	10.92	36.31	10.74	35.12	10.30	32.74	9.44
	3	2.2	40.00	10.78	39.88	10.97	37.50	10.16	36.31	9.76	35.12	9.38	32.74	8.60
	5	4.1	42.02	10.97	39.88	10.31	37.50	9.55	36.31	9.19	35.12	8.83	32.74	8.11
	7	6	42.26	10.41	39.88	9.69	37.50	8.99	36.31	8.65	35.12	8.31	32.74	7.65
	9	7.9	42.26	9.78	39.88	9.12	37.50	8.46	36.31	8.04	35.12	7.83	32.74	7.22
	11	9.8	42.26	9.21	39.88	8.59	37.50	7.99	36.31	7.68	35.12	7.39	32.74	6.82
	13	11.8	42.26	8.65	39.88	8.08	37.50	7.52	36.31	7.24	35.12	6.97	32.74	6.43
	15	13.7	42.26	8.16	39.88	7.62	37.50	7.10	36.31	6.84	35.12	6.59	32.74	6.09
90%	-19.8	-20	23.77	8.78	23.65	9.08	23.65	9.40	23.53	9.55	23.53	9.71	23.53	10.02
	-18.8	-19	24.12	8.87	24.12	9.19	24.01	9.49	24.01	9.64	24.01	9.80	23.88	10.10
	-16.7	-17	25.08	9.09	24.95	9.39	24.95	9.68	24.95	9.83	24.84	9.97	24.84	10.26
	-13.7	-15	26.14	9.32	26.02	9.60	26.02	9.88	25.91	10.02	25.91	10.16	25.91	10.44
	-11.8	-13	27.21	9.54	27.21	9.81	27.09	10.08	27.09	10.22	27.09	10.34	26.98	10.61
	-9.8	-11	28.52	9.76	28.52	10.02	28.40	10.27	28.40	10.40	28.40	10.54	28.28	10.80
	-9.5	-10	29.23	9.88	29.12	10.13	29.12	10.38	29.00	10.51	29.00	10.64	29.00	10.88
	-8.5	-9.1	29.83	9.98	29.83	10.23	29.71	10.47	29.71	10.59	29.71	10.72	29.35	10.82
	-7	-7.6	30.90	10.15	30.90	10.38	30.78	10.62	30.78	10.74	30.78	10.86	29.35	10.33
	-5	-5.6	32.56	10.37	32.44	10.59	32.44	10.81	32.32	10.93	31.49	10.59	29.35	9.71
	-3	-3.7	34.11	10.57	34.11	10.78	33.75	10.82	32.56	10.39	31.49	9.97	29.35	9.15
	0	-0.7	36.96	10.87	35.89	10.60	33.75	9.82	32.56	9.43	31.49	9.06	29.35	8.32
	3	2.2	38.03	10.36	35.89	9.64	33.75	8.94	32.56	8.60	31.49	8.27	29.35	7.61
	5	4.1	38.03	9.74	35.89	9.07	33.75	8.43	32.56	8.10	31.49	7.80	29.35	7.18
	7	6	38.03	9.15	35.89	8.55	33.75	7.94	32.56	7.65	31.49	7.36	29.35	6.78
	9	7.9	38.03	8.63	35.89	8.04	33.75	7.48	32.56	7.22	31.49	6.95	29.35	6.41
	11	9.8	38.03	8.13	35.89	7.59	33.75	7.08	32.56	6.82	31.49	6.56	29.35	6.07
	13	11.8	38.03	7.65	35.89	7.16	33.75	6.67	32.56	6.43	31.49	6.20	29.35	5.73
	15	13.7	38.03	7.23	35.89	6.76	33.75	6.32	32.56	6.09	31.49	5.87	29.35	5.44
80%	-19.8	-20	23.69	9.39	23.57	9.66	23.57	9.94	23.57	10.08	23.45	10.22	23.45	10.48
	-18.8	-19	24.05	9.47	24.05	9.75	23.93	10.02	23.93	10.16	23.93	10.29	23.81	10.57
	-16.7	-17	25.00	9.67	24.88	9.92	24.88	10.19	24.88	10.32	24.88	10.45	24.76	10.71
	-13.7	-15	26.07	9.87	25.95	10.11	25.95	10.37	25.95	10.48	25.83	10.61	25.83	10.87
	-11.8	-13	27.14	10.06	27.14	10.31	27.02	10.54	27.02	10.66	27.02	10.79	26.19	10.50
	-9.8	-11	28.45	10.26	28.45	10.50	28.33	10.73	28.33	10.83	28.10	10.81	26.19	9.91
	-9.5	-10	29.17	10.37	29.04	10.59	29.05	10.81	29.05	10.93	28.10	10.50	26.19	9.62
	-8.5	-9.1	29.76	10.46	27.66	10.68	29.64	10.89	29.05	10.65	28.10	10.22	26.19	9.36
	-7	-7.6	30.83	10.61	30.83	10.82	30.00	10.59	29.05	10.17	28.10	9.76	26.19	8.95
	-5	-5.6	32.50	10.80	31.91	10.74	30.00	9.95	29.05	9.56	28.10	9.18	26.19	8.43
	-3	-3.7	33.81	10.86	31.91	10.11	30.00	9.36	29.05	9.01	28.10	8.65	26.19	7.96
	0	-0.7	33.81	9.85	31.91	9.18	30.00	8.52	29.05	8.21	28.10	7.88	26.19	7.26
	3	2.2	33.81	8.98	31.91	8.37	30.00	7.79	29.05	7.50	28.10	7.22	26.19	6.65
	5	4.1	33.81	8.45	31.91	7.89	30.00	7.34	29.05	7.07	28.10	6.82	26.19	6.29
	7	6	33.81	7.96	31.91	7.45	30.00	6.93	29.05	6.69	28.10	6.44	26.19	5.95
	9	7.9	33.81	7.52	31.91	7.03	30.00	6.55	29.05	6.32	28.10	6.09	26.19	5.64
	11	9.8	33.81	7.10	31.91	6.64	30.00	6.20	29.05	5.98	28.10	5.77	26.19	5.35
	13	11.8	33.81	6.69	31.91	6.27	30.00	5.86	29.05	5.65	28.10	5.45	26.19	5.06
	15	13.7	33.81	6.33	31.91	5.94	30.00	5.56	29.05	5.36	28.10	5.17	26.19	4.81
70%	-19.8	-20	23.52	9.99	23.40	10.23	23.40	10.47	23.40	10.59	23.40	10.72	22.81	10.60
	-18.8	-19	23.87	10.07	23.87	10.31	23.76	10.54	23.76	10.66	23.76	10.79	22.81	10.38
	-16.7	-17	24.82	10.24	24.82	10.47	24.71	10.69	24.71	10.81	24.47	9.63	22.81	9.90
	-13.7	-15	25.89	10.41	25.77	10.64	25.77	10.86	25.30	10.69	24.47	10.26	22.81	9.41
	-11.8	-13	26.96	10.59	26.96	10.80	26.25	10.54	25.30	10.13	24.47	9.73	22.81	8.92
	-9.8	-11	28.27	10.76	27.91	10.75	26.25	9.96	25.30	9.57	24.47	9.19	22.81	8.44
	-9.5	-10	28.98	10.86	27.91	10.44	26.25	9.67	25.30	9.29	24.47	8.93	22.81	8.21

	-8.5	-9.1	29.58	10.92	27.91	10.16	26.25	9.41	25.30	9.05	24.47	8.70	22.81	8.00
	-7	-7.6	29.58	10.43	27.91	9.70	26.25	9.00	25.30	8.66	24.47	8.32	22.81	7.66
	-5	-5.6	29.58	9.80	27.91	9.13	26.25	8.48	25.30	8.15	24.47	9.63	22.81	7.23
	-3	-3.7	29.58	9.22	27.91	8.60	26.25	8.00	25.30	7.69	24.47	7.40	22.81	6.83
	0	-0.7	29.58	8.39	27.91	7.85	26.25	7.30	25.30	7.03	24.47	6.77	22.81	6.26
	3	2.2	29.58	7.67	27.91	7.18	26.25	6.69	25.30	6.44	24.47	6.21	22.81	5.74
	5	4.1	29.58	7.24	27.91	6.77	26.25	6.33	25.30	6.09	24.47	5.87	22.81	5.44
	7	6	29.58	6.84	27.91	6.41	26.25	5.98	25.30	5.77	24.47	5.57	22.81	5.16
	9	7.9	29.58	6.47	27.91	6.06	26.25	5.66	25.30	5.46	24.47	5.28	22.81	4.89
	11	9.8	29.58	6.12	27.91	5.73	26.25	5.37	25.30	5.18	24.47	5.01	22.81	4.65
	13	11.8	29.58	5.78	27.91	5.43	26.25	5.08	25.30	4.92	24.47	4.74	22.81	4.41
	15	13.7	29.58	5.48	27.91	5.15	26.25	4.82	25.30	4.67	24.47	4.51	22.81	4.20
60%	-19.8	-20	23.45	10.60	23.33	10.80	22.50	10.39	21.79	9.98	21.07	9.58	19.64	8.79
	-18.8	-19	23.81	10.67	23.81	10.87	22.50	10.17	21.79	9.77	21.07	9.37	19.64	8.60
	-16.7	-17	24.76	10.81	23.93	10.47	22.50	9.70	21.79	9.33	21.07	8.95	19.64	8.23
	-13.7	-15	25.36	10.69	23.93	9.95	22.50	9.22	21.79	8.87	21.07	8.52	19.64	7.83
	-11.8	-13	25.36	10.12	23.93	9.42	22.50	8.74	21.79	8.42	21.07	8.09	19.64	7.48
	-9.8	-11	25.36	9.56	23.93	8.91	22.50	8.28	21.79	7.96	21.07	7.66	19.64	7.06
	-9.5	-10	25.36	9.29	23.93	8.66	22.50	8.04	21.79	7.75	21.07	7.45	19.64	6.86
	-8.5	-9.1	25.36	9.05	23.93	8.44	22.50	7.85	21.79	7.55	21.07	7.26	19.64	6.70
	-7	-7.6	25.36	8.65	23.93	8.08	22.50	7.51	21.79	7.24	21.07	6.96	19.64	6.43
	-5	-5.6	25.36	8.15	23.93	7.61	22.50	7.09	21.79	6.83	21.07	6.57	19.64	6.08
	-3	-3.7	25.36	7.69	23.93	7.19	22.50	6.70	21.79	6.47	21.07	6.22	19.64	5.76
	0	-0.7	25.36	7.03	23.93	6.58	22.50	6.14	21.79	5.93	21.07	5.71	19.64	5.29
	3	2.2	25.36	6.44	23.93	6.05	22.50	5.65	21.79	5.45	21.07	5.27	19.64	4.88
	5	4.1	25.36	6.09	23.93	5.72	22.50	5.35	21.79	5.17	21.07	4.99	19.64	4.63
	7	6	25.36	5.77	23.93	5.42	22.50	5.07	21.79	4.90	21.07	4.74	19.64	4.40
	9	7.9	25.36	5.46	23.93	5.14	22.50	4.81	21.79	4.66	21.07	4.49	19.64	4.19
	11	9.8	25.36	5.18	23.93	4.88	22.50	4.58	21.79	4.42	21.07	4.27	19.64	3.99
	13	11.8	25.36	4.90	23.93	4.62	22.50	4.34	21.79	4.20	21.07	4.06	19.64	3.79
	15	13.7	25.36	4.67	23.93	4.39	22.50	4.13	21.79	4.00	21.07	3.88	19.64	3.62
50%	-19.8	-20	21.12	9.64	19.94	8.98	18.75	8.34	18.04	8.03	17.45	7.72	16.26	7.11
	-18.8	-19	21.12	9.43	19.94	8.79	18.75	8.17	18.04	7.86	17.45	7.55	16.26	6.97
	-16.7	-17	21.12	9.00	19.94	8.39	18.75	7.81	18.04	7.52	17.45	7.24	16.26	6.68
	-13.7	-15	21.12	8.57	19.94	8.00	18.75	7.44	18.04	7.17	17.45	6.90	16.26	6.37
	-11.8	-13	21.12	8.14	19.94	7.60	18.75	7.07	18.04	6.82	17.45	6.56	16.26	6.07
	-9.8	-11	21.12	7.71	19.94	7.20	18.75	6.71	18.04	6.47	17.45	6.23	16.26	5.77
	-9.5	-10	21.12	7.50	19.94	7.00	18.75	6.54	18.04	6.30	17.45	6.07	16.26	5.62
	-8.5	-9.1	21.12	7.31	19.94	6.84	18.75	6.37	18.04	6.15	17.45	5.93	16.26	5.49
	-7	-7.6	21.12	7.00	19.94	6.56	18.75	6.12	18.04	5.91	17.45	5.70	16.26	5.28
	-5	-5.6	21.12	6.61	19.94	6.20	18.75	5.79	18.04	5.59	17.45	5.39	16.26	5.00
	-3	-3.7	21.12	6.26	19.94	5.87	18.75	5.49	18.04	5.30	17.45	5.11	16.26	4.75
	0	-0.7	21.12	5.74	19.94	5.39	18.75	5.05	18.04	4.88	17.45	4.72	16.26	4.39
	3	2.2	21.12	5.29	19.94	4.97	18.75	4.66	18.04	4.51	17.45	4.35	16.26	4.06
	5	4.1	21.12	5.02	19.94	4.72	18.75	4.42	18.04	4.28	17.45	4.14	16.26	3.86
	7	6	21.12	4.76	19.94	4.48	18.75	4.21	18.04	4.07	17.45	3.95	16.26	3.69
	9	7.9	21.12	4.52	19.94	4.26	18.75	4.00	18.04	3.89	17.45	3.76	16.26	3.51
	11	9.8	21.12	4.30	19.94	4.05	18.75	3.82	18.04	3.70	17.45	3.58	16.26	3.35
	13	11.8	21.12	4.09	19.94	3.85	18.75	3.63	18.04	3.53	17.45	3.41	16.26	3.20
	15	13.7	21.12	3.89	19.94	3.68	18.75	3.47	18.04	3.36	17.45	3.26	16.26	3.06

Note:

- 1,  is shown as reference
- 2, In cooling mode, avoid the outdoor air temperature range from 42-48 degree C, when selecting the models
In heating mode, avoid the outdoor air temperature range from -15 to -20 degree C, when selecting the models
- 3, The above table shows the average value of conditions may operate
- 4, It is recommended to connect less than 130%

14HP cooling mode

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(° C DB/WD)													
		DB:20.8,WB:14		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
130%	-5	35.14	5.03	41.86	6.14	48.57	6.58	50.43	6.85	52.85	7.05	54.14	7.66	55.50	7.71
	-2	35.14	5.03	41.86	6.26	48.57	6.58	50.43	6.89	52.85	7.05	54.14	7.76	55.50	7.79
	0	35.14	5.12	41.86	6.37	48.57	6.83	50.43	7.27	52.85	7.46	54.14	7.85	55.50	7.89
	2	35.14	5.21	41.86	6.38	48.57	7.06	50.43	7.68	52.85	7.54	54.14	7.91	55.50	8.01
	4	35.14	5.33	41.86	6.51	48.57	7.30	50.43	7.71	52.85	7.64	54.14	7.91	55.50	8.16
	6	35.14	5.43	41.86	6.64	48.57	7.57	50.43	7.78	52.26	7.88	53.48	7.91	54.89	8.22
	8	35.14	5.56	41.86	6.79	48.57	7.95	50.43	8.16	51.62	8.13	52.90	3.90	54.19	8.30
	10	35.14	5.67	41.86	6.94	48.57	8.25	50.43	8.43	51.00	4.04	52.28	4.06	53.57	8.54
	12	35.14	5.77	41.86	7.07	48.57	8.41	49.71	4.03	50.43	4.06	51.57	4.07	52.86	8.59
	14	35.14	5.89	41.86	7.20	48.43	4.05	49.14	4.06	49.71	4.08	51.00	4.09	52.28	8.79
	16	35.14	5.99	41.86	7.35	47.86	4.06	48.43	4.08	49.00	4.10	50.28	4.12	51.57	8.93
	18	35.14	6.11	41.86	7.50	47.14	8.79	47.71	8.84	48.43	8.89	49.71	8.98	51.00	9.06
	20	35.14	6.24	41.86	7.98	46.43	9.23	47.14	9.27	47.71	9.32	49.00	9.41	50.28	9.51
	21	35.14	6.40	41.86	8.26	46.14	9.44	46.85	9.49	47.43	9.54	48.71	9.64	50.00	9.72
	23	35.14	6.87	41.86	8.86	45.57	9.87	46.14	9.92	46.71	9.97	48.00	10.07	49.28	10.17
	25	35.14	7.33	41.86	9.49	44.85	10.30	45.43	10.35	46.14	10.42	47.43	10.52	48.71	10.62
	27	35.14	7.83	41.86	10.15	44.28	10.73	44.85	10.80	45.43	10.85	46.71	10.97	48.00	11.08
	29	35.14	8.36	41.86	10.85	43.57	11.17	44.14	11.23	44.85	11.30	46.14	11.42	47.43	11.53
	31	35.14	8.93	41.71	11.48	42.85	11.61	43.57	11.68	44.14	11.73	45.43	11.86	46.71	12.00
	33	35.14	9.51	41.00	11.91	42.28	12.04	42.85	12.11	43.57	12.18	44.85	12.31	46.00	12.44
	35	35.14	10.14	40.28	12.34	41.57	12.49	42.28	12.56	42.85	12.63	44.14	12.78	45.43	12.91
	37	35.14	10.79	39.71	12.79	41.00	12.94	41.57	13.01	42.28	13.09	43.43	13.24	44.71	13.39
	39	35.14	11.48	39.00	12.93	40.28	13.37	41.00	13.46	41.57	13.54	42.85	13.69	44.14	13.85
	41	35.14	12.08	38.60	13.05	39.86	13.50	40.58	13.58	41.15	13.66	42.43	13.72	42.45	13.98
	43	35.14	12.39	38.31	13.11	39.65	13.54	40.36	13.64	40.72	13.68	41.66	13.74	41.94	14.01
	45	35.14	13.01	38.07	13.24	39.23	13.66	39.94	13.73	40.13	13.75	40.53	13.79	41.12	14.27
	48	35.14	10.53	39.43	10.15	42.76	10.52	43.56	10.43	43.91	10.49	43.72	10.48	44.51	11.31
120%	-5	32.43	4.86	38.57	5.89	44.86	6.96	48.00	7.59	50.29	7.91	51.43	8.17	52.57	8.38
	-2	32.43	4.91	38.57	5.95	44.86	7.03	48.00	7.64	50.29	8.01	51.43	8.23	52.57	8.41
	0	32.43	4.95	38.57	5.99	44.86	7.11	48.00	7.65	50.29	8.08	51.43	8.28	52.57	8.43
	2	32.43	4.97	38.57	6.05	44.86	7.16	48.00	7.73	50.29	8.11	51.43	8.35	52.57	8.45
	4	32.43	5.02	38.57	6.13	44.86	7.26	48.00	7.80	50.29	8.22	51.43	8.36	52.57	8.47
	6	32.43	5.07	38.57	6.18	44.86	7.35	48.00	7.88	50.29	8.31	51.43	8.43	52.57	8.50
	8	32.43	5.12	38.57	6.24	44.86	7.45	48.00	7.98	50.29	8.39	51.43	8.46	52.57	8.54
	10	32.43	5.18	38.57	6.32	44.86	7.52	48.00	8.13	50.29	8.40	51.43	8.48	52.57	8.57
	12	32.43	5.28	38.57	6.44	44.86	7.66	48.00	8.28	49.57	8.43	50.71	8.44	51.86	8.63
	14	32.43	5.38	38.57	6.57	44.86	7.81	48.00	8.45	48.86	8.48	50.14	8.56	51.28	8.73
	16	32.43	5.47	38.57	6.70	44.86	7.96	47.71	4.10	48.28	8.61	49.43	8.71	50.57	8.87
	18	32.43	5.57	38.57	6.84	44.86	8.23	47.00	8.79	47.57	8.83	48.72	8.91	50.00	8.99
	20	32.43	5.69	38.57	7.10	44.86	8.86	46.43	9.22	47.00	9.26	48.14	9.34	49.29	9.42
	21	32.43	5.74	38.57	7.35	44.86	9.17	46.00	9.44	46.57	9.47	47.86	9.56	49.00	9.66
	23	32.43	6.14	38.57	7.88	44.86	9.82	45.43	9.85	46.00	9.90	47.14	10.00	48.28	10.09
	25	32.43	6.55	38.57	8.43	44.14	10.25	44.71	10.29	45.28	10.34	46.57	10.44	47.71	10.53
	27	32.43	7.00	38.57	9.01	43.57	10.67	44.14	10.73	44.71	10.78	45.86	10.88	47.00	10.98
	29	32.43	7.47	38.57	9.62	42.86	11.10	43.43	11.16	44.00	11.21	45.14	11.33	46.43	11.43
	31	32.43	7.96	38.57	10.27	42.14	11.55	42.86	11.60	43.43	11.66	44.57	11.78	45.71	11.90
	33	32.43	8.48	38.57	10.95	41.57	11.98	42.14	12.04	42.71	12.09	43.86	12.23	45.00	12.34
	35	32.43	9.03	38.57	11.68	40.86	12.41	41.43	12.48	42.14	12.54	43.28	12.68	44.43	12.81
	37	32.43	9.61	38.57	12.44	40.28	12.86	40.86	12.92	41.43	12.99	42.57	13.12	43.71	13.27
	39	32.43	10.22	38.43	13.14	39.57	13.29	40.14	13.37	40.72	13.44	42.00	13.59	43.14	13.72
	41	32.43	10.50	38.12	13.23	39.26	13.38	39.83	13.47	40.40	13.53	41.69	13.63	41.90	13.82
	43	32.43	10.66	37.91	13.33	38.95	13.46	39.52	13.52	40.09	13.58	40.96	13.66	41.25	14.10
	45	32.43	10.78	37.71	13.45	38.58	13.59	39.11	13.64	39.74	13.69	40.14	13.71	40.84	14.41
	48	37.57	7.02	43.32	8.73	44.12	8.84	44.59	8.94	45.54	8.93	45.78	8.80	46.69	9.34
110%	-5	29.71	4.24	35.43	5.28	41.14	6.30	44.00	6.77	46.86	7.28	50.43	7.56	51.57	7.80
	-2	29.71	4.33	35.43	5.35	41.14	6.36	44.00	6.84	46.86	7.34	50.43	7.64	51.57	7.84
	0	29.71	4.37	35.43	5.38	41.14	6.41	44.00	6.88	46.86	7.42	50.43	7.71	51.57	7.93
	2	29.71	4.46	35.43	5.43	41.14	6.51	44.00	6.95	46.86	7.50	50.43	7.82	51.57	8.03
	4	29.71	4.55	35.43	5.50	41.14	6.57	44.00	7.04	46.86	7.61	50.43	7.93	51.57	8.11

	6	29.71	4.60	35.43	5.56	41.14	6.63	44.00	7.15	46.86	7.70	50.43	8.02	51.57	8.23
	8	29.71	4.64	35.43	5.65	41.14	6.71	44.00	7.23	46.86	7.79	50.43	8.07	51.57	8.32
	10	29.71	4.69	35.43	5.72	41.14	6.80	44.00	7.35	46.86	7.91	50.43	8.13	51.57	8.39
	12	29.71	4.80	35.43	5.84	41.14	6.94	44.00	7.50	46.86	8.06	49.86	8.25	50.86	8.50
	14	29.71	4.88	35.43	5.94	41.14	7.07	44.00	7.63	46.86	8.21	49.14	8.31	50.29	8.56
	16	29.71	4.96	35.43	6.06	41.14	7.20	44.00	7.78	46.86	8.38	48.57	8.41	49.57	8.65
	18	29.71	5.06	35.43	6.17	41.14	7.35	44.00	8.00	46.86	8.78	47.86	8.84	49.00	8.93
	20	29.71	5.16	35.43	6.30	41.14	7.78	44.00	8.59	46.14	9.21	47.29	9.27	48.29	9.36
	21	29.71	5.21	35.43	6.49	41.14	8.06	44.00	8.91	45.86	9.42	46.86	9.49	48.00	9.57
	23	29.71	5.46	35.43	6.95	41.14	8.64	44.00	9.56	45.15	9.84	46.29	9.94	47.29	10.02
	25	29.71	5.82	35.43	7.43	41.14	9.24	44.00	10.24	44.57	10.27	45.57	10.37	46.71	10.45
	27	29.71	6.21	35.43	7.95	41.14	9.89	43.29	10.67	43.86	10.70	45.00	10.80	46.00	10.90
	29	29.71	6.62	35.43	8.48	41.14	10.57	42.72	11.10	43.29	11.15	44.29	11.25	45.43	11.35
	31	29.71	7.05	35.43	9.04	41.14	11.28	42.00	11.53	42.57	11.58	43.72	11.68	44.71	11.80
	33	29.71	7.50	35.43	9.64	40.86	11.90	41.43	11.96	42.00	12.01	43.00	12.13	44.14	12.24
	35	29.71	7.98	35.43	10.27	40.15	12.33	40.72	12.39	41.29	12.46	42.29	12.58	43.43	12.69
	37	29.71	8.49	35.43	10.93	39.57	12.78	40.15	12.83	40.57	12.89	41.72	13.02	42.72	13.14
	39	29.71	9.03	35.43	11.65	38.86	13.21	39.43	13.27	40.00	13.34	41.00	13.47	42.15	13.60
	41	29.71	9.12	35.43	11.74	38.55	13.30	39.12	13.37	39.70	13.43	40.48	13.56	40.88	13.70
	43	29.71	9.21	35.43	11.89	38.25	13.39	38.82	13.46	39.39	13.53	40.12	13.61	40.25	13.98
	45	29.71	9.51	35.43	11.96	37.86	13.52	38.41	13.62	39.04	13.65	39.71	13.99	39.87	14.30
	48	32.54	7.03	38.80	8.76	40.86	9.88	41.40	10.04	42.27	9.98	42.78	10.85	43.11	10.48
100%	-5	27.00	3.87	32.14	4.65	37.43	5.54	40.00	5.93	42.57	6.44	47.86	7.34	50.57	7.66
	-2	27.00	3.91	32.14	4.71	37.43	5.60	40.00	6.04	42.57	6.52	47.86	7.42	50.57	7.71
	0	27.00	3.95	32.14	4.76	37.43	5.66	40.00	6.12	42.57	6.59	47.86	7.55	50.57	7.79
	2	27.00	4.03	32.14	4.83	37.43	5.72	40.00	6.20	42.57	6.66	47.86	7.66	50.57	7.92
	4	27.00	4.06	32.14	4.87	37.43	5.81	40.00	6.29	42.57	6.75	47.86	7.73	50.57	8.00
	6	27.00	4.12	32.14	4.97	37.43	5.88	40.00	6.40	42.57	6.84	47.86	7.84	50.57	8.12
	8	27.00	4.20	32.14	5.05	37.43	5.99	40.00	6.48	42.57	6.96	47.86	7.96	50.57	8.26
	10	27.00	4.25	32.14	5.14	37.43	6.09	40.00	6.59	42.57	7.08	47.86	8.10	50.57	8.38
	12	27.00	4.31	32.14	5.24	37.43	6.20	40.00	6.70	42.57	7.22	47.86	8.25	49.86	8.44
	14	27.00	4.40	32.14	5.34	37.43	6.32	40.00	6.84	42.57	7.35	47.86	8.41	49.28	8.55
	16	27.00	4.48	32.14	5.44	37.43	6.45	40.00	6.97	42.57	7.50	47.57	8.51	48.57	8.64
	18	27.00	4.56	32.14	5.54	37.43	6.57	40.00	7.10	42.57	7.65	47.00	8.79	48.00	8.86
	20	27.00	4.65	32.14	5.66	37.43	6.77	40.00	7.46	42.57	8.20	46.28	9.21	47.28	9.29
	21	27.00	4.70	32.14	5.71	37.43	7.02	40.00	7.73	42.57	8.48	46.00	9.42	47.00	9.51
	23	27.00	4.81	32.14	6.09	37.43	7.52	40.00	8.28	42.57	9.09	45.43	9.85	46.28	9.94
	25	27.00	5.13	32.14	6.50	37.43	8.05	40.00	8.88	42.57	9.74	44.72	10.29	45.71	10.37
	27	27.00	5.47	32.14	6.93	37.43	8.59	40.00	9.49	42.57	10.42	44.00	10.72	45.00	10.82
	29	27.00	5.82	32.14	7.40	37.43	9.17	40.00	10.14	42.43	11.07	43.43	11.17	44.43	11.25
	31	27.00	6.20	32.14	7.90	37.43	9.79	40.00	10.82	41.86	11.50	42.72	11.60	43.71	11.70
	33	27.00	6.59	32.14	8.41	37.43	10.44	40.00	11.55	41.14	11.93	42.14	12.03	43.14	12.14
	35	27.00	7.00	32.14	8.94	37.43	11.13	40.00	12.31	40.43	12.36	41.43	12.47	42.43	12.58
	37	27.00	7.45	32.14	9.52	37.43	11.86	39.28	12.74	39.86	12.81	40.86	12.92	41.72	13.02
	39	27.00	7.91	32.14	10.12	37.43	12.63	38.71	13.17	39.14	13.24	40.14	13.36	41.14	13.49
	41	27.00	8.28	32.14	10.49	37.43	13.09	38.11	13.27	38.84	13.44	39.45	13.67	40.54	13.77
	43	27.00	8.65	32.14	10.86	37.43	13.33	37.51	13.42	38.56	13.57	39.68	13.76	39.83	13.92
	45	27.00	9.14	32.14	11.35	37.43	13.56	36.71	13.60	38.36	13.82	39.34	13.97	39.03	14.10
	48	27.96	9.60	33.29	11.75	38.76	13.58	36.46	13.40	39.67	13.97	38.26	13.94	39.54	14.06
90%	-5	24.29	3.42	29.00	4.10	33.71	4.84	36.00	5.28	38.29	5.62	43.00	6.46	47.71	7.39
	-2	24.29	3.45	29.00	4.14	33.71	4.90	36.00	5.35	38.29	5.68	43.00	6.52	47.71	7.47
	0	24.29	3.50	29.00	4.20	33.71	4.97	36.00	5.42	38.29	5.76	43.00	6.59	47.71	7.53
	2	24.29	3.55	29.00	4.25	33.71	5.03	36.00	5.50	38.29	5.85	43.00	6.73	47.71	7.64
	4	24.29	3.61	29.00	4.31	33.71	5.11	36.00	5.57	38.29	5.92	43.00	6.84	47.71	7.75
	6	24.29	3.66	29.00	4.40	33.71	5.21	36.00	5.68	38.29	6.03	43.00	6.94	47.71	7.88
	8	24.29	3.73	29.00	4.48	33.71	5.31	36.00	5.75	38.29	6.13	43.00	7.07	47.71	7.95
	10	24.29	3.80	29.00	4.58	33.71	5.41	36.00	5.84	38.29	6.27	43.00	7.16	47.71	8.08
	12	24.29	3.87	29.00	4.66	33.71	5.51	36.00	5.94	38.29	6.39	43.00	7.30	47.71	8.23
	14	24.29	3.93	29.00	4.74	33.71	5.61	36.00	6.06	38.29	6.50	43.00	7.43	47.71	8.38
	16	24.29	4.00	29.00	4.83	33.71	5.72	36.00	6.17	38.29	6.64	43.00	7.58	47.57	8.53
	18	24.29	4.06	29.00	4.93	33.71	5.82	36.00	6.29	38.29	6.77	43.00	7.73	47.00	8.79
	20	24.29	4.15	29.00	5.04	33.71	5.94	36.00	6.42	38.29	7.02	43.00	8.31	46.29	9.21
	21	24.29	4.18	29.00	5.08	33.71	6.04	36.00	6.64	38.29	7.27	43.00	8.61	46.00	9.42
	23	24.29	4.26	29.00	5.28	33.71	6.47	36.00	7.12	38.29	7.80	43.00	9.24	45.28	9.85

Specification and performance

MCAC-VTSM-2012-09

	25	24.29	4.50	29.00	5.64	33.71	6.92	36.00	7.61	38.29	8.33	43.00	9.89	44.72	10.29
	27	24.29	4.78	29.00	6.01	33.71	7.38	36.00	8.13	38.29	8.91	43.00	10.58	44.00	10.72
	29	24.29	5.09	29.00	6.40	33.71	7.88	36.00	8.68	38.29	9.52	42.57	11.07	43.43	11.15
	31	24.29	5.41	29.00	6.82	33.71	8.39	36.00	9.26	38.29	10.15	41.86	11.50	42.71	11.60
	33	24.29	5.74	29.00	7.25	33.71	8.96	36.00	9.87	38.29	10.83	41.28	11.94	42.14	12.03
	35	24.29	6.10	29.00	7.71	33.71	9.54	36.00	10.52	38.29	11.55	40.57	12.38	41.43	12.48
	37	24.29	6.47	29.00	8.20	33.71	10.15	36.00	11.20	38.29	12.31	39.86	12.81	40.86	12.91
	39	24.29	6.87	29.00	8.73	33.71	10.80	36.00	11.93	38.29	13.11	39.29	13.26	40.14	13.35
	41	24.29	7.10	29.00	9.12	33.71	11.19	36.00	12.24	38.29	13.18	39.01	13.59	39.87	13.67
	43	24.29	7.45	29.00	9.52	33.71	11.59	36.00	12.56	38.29	13.47	38.81	13.77	39.53	13.88
	45	24.29	7.92	29.00	9.99	33.71	12.06	36.00	12.98	38.29	13.84	38.60	13.91	38.93	14.07
	48	24.29	6.07	29.00	7.54	33.71	9.01	36.00	9.66	38.29	10.07	42.53	10.04	42.08	10.15
80%	-5	21.57	3.01	25.72	3.56	29.86	4.22	32.00	4.48	34.14	4.83	38.28	5.58	42.43	6.37
	-2	21.57	3.06	25.72	3.61	29.86	4.25	32.00	4.55	34.14	4.87	38.28	5.63	42.43	6.43
	0	21.57	3.11	25.72	3.65	29.86	4.31	32.00	4.61	34.14	4.96	38.28	5.71	42.43	6.52
	2	21.57	3.17	25.72	3.70	29.86	4.37	32.00	4.70	34.14	5.05	38.28	5.83	42.43	6.64
	4	21.57	3.22	25.72	3.77	29.86	4.45	32.00	4.80	34.14	5.14	38.28	5.94	42.43	6.73
	6	21.57	3.28	25.72	3.85	29.86	4.52	32.00	4.91	34.14	5.24	38.28	6.02	42.43	6.85
	8	21.57	3.34	25.72	3.94	29.86	4.62	32.00	4.99	34.14	5.35	38.28	6.11	42.43	6.98
	10	21.57	3.37	25.72	4.03	29.86	4.75	32.00	5.11	34.14	5.48	38.28	6.25	42.43	7.05
	12	21.57	3.42	25.72	4.10	29.86	4.83	32.00	5.21	34.14	5.59	38.28	6.37	42.43	7.18
	14	21.57	3.48	25.72	4.18	29.86	4.91	32.00	5.29	34.14	5.69	38.28	6.49	42.43	7.32
	16	21.57	3.53	25.72	4.25	29.86	5.01	32.00	5.39	34.14	5.79	38.28	6.62	42.43	7.45
	18	21.57	3.60	25.72	4.33	29.86	5.11	32.00	5.51	34.14	5.91	38.28	6.75	42.43	7.60
	20	21.57	3.67	25.72	4.41	29.86	5.21	32.00	5.61	34.14	6.02	38.28	7.00	42.43	8.13
	21	21.57	3.70	25.72	4.45	29.86	5.26	32.00	5.67	34.14	6.16	38.28	7.25	42.43	8.43
	23	21.57	3.77	25.72	4.55	29.86	5.51	32.00	6.04	34.14	6.59	38.28	7.76	42.43	9.04
	25	21.57	3.88	25.72	4.83	29.86	5.89	32.00	6.45	34.14	7.03	38.28	8.31	42.43	9.67
	27	21.57	4.13	25.72	5.14	29.86	6.27	32.00	6.89	34.14	7.52	38.28	8.88	42.43	10.35
	29	21.57	4.40	25.72	5.48	29.86	6.69	32.00	7.33	34.14	8.03	38.28	9.47	42.43	11.07
	31	21.57	4.66	25.72	5.82	29.86	7.12	32.00	7.81	34.14	8.56	38.28	10.12	41.72	11.50
	33	21.57	4.96	25.72	6.19	29.86	7.58	32.00	8.33	34.14	9.11	38.28	10.78	41.14	11.93
	35	21.57	5.26	25.72	6.59	29.86	8.06	32.00	8.86	34.14	9.71	38.28	11.50	40.43	12.36
	37	21.57	5.57	25.72	6.98	29.86	8.58	32.00	9.44	34.14	10.34	38.28	12.26	39.86	12.79
	39	21.57	5.91	25.72	7.45	29.86	9.13	32.00	10.04	34.14	11.00	38.28	13.06	39.14	13.24
	41	21.57	6.04	25.72	7.52	29.86	9.26	32.00	10.30	34.14	11.20	38.28	13.39	38.90	13.47
	43	21.57	6.22	25.72	7.58	29.86	9.39	32.00	10.48	34.14	11.35	38.28	13.54	38.66	13.62
	45	21.57	6.39	25.72	7.67	29.86	9.57	32.00	10.70	34.14	11.55	38.28	13.69	38.18	13.84
	48	21.57	4.18	25.72	5.00	33.59	6.32	32.00	7.12	34.14	7.61	38.28	8.98	42.60	9.18
70%	-5	18.86	2.69	22.57	3.15	26.14	3.57	28.00	3.83	29.86	4.09	33.43	4.68	37.14	5.38
	-2	18.86	2.71	22.57	3.17	26.14	3.59	28.00	3.90	29.86	4.16	33.43	4.75	37.14	5.45
	0	18.86	2.73	22.57	3.21	26.14	3.67	28.00	3.98	29.86	4.24	33.43	4.85	37.14	5.52
	2	18.86	2.74	22.57	3.23	26.14	3.73	28.00	4.05	29.86	4.31	33.43	4.95	37.14	5.61
	4	18.86	2.78	22.57	3.31	26.14	3.81	28.00	4.13	29.86	4.41	33.43	5.03	37.14	5.75
	6	18.86	2.82	22.57	3.36	26.14	3.90	28.00	4.26	29.86	4.51	33.43	5.12	37.14	5.86
	8	18.86	2.87	22.57	3.46	26.14	3.99	28.00	4.32	29.86	4.60	33.43	5.27	37.14	5.97
	10	18.86	2.93	22.57	3.52	26.14	4.10	28.00	4.41	29.86	4.73	33.43	5.38	37.14	6.04
	12	18.86	3.00	22.57	3.57	26.14	4.18	28.00	4.50	29.86	4.81	33.43	5.47	37.14	6.16
	14	18.86	3.05	22.57	3.63	26.14	4.25	28.00	4.56	29.86	4.89	33.43	5.57	37.14	6.27
	16	18.86	3.10	22.57	3.70	26.14	4.33	28.00	4.66	29.86	4.99	33.43	5.67	37.14	6.39
	18	18.86	3.15	22.57	3.77	26.14	4.41	28.00	4.74	29.86	5.08	33.43	5.79	37.14	6.52
	20	18.86	3.20	22.57	3.83	26.14	4.50	28.00	4.83	29.86	5.18	33.43	5.91	37.14	6.70
	21	18.86	3.24	22.57	3.87	26.14	4.53	28.00	4.88	29.86	5.23	33.43	5.99	37.14	6.93
	23	18.86	3.28	22.57	3.93	26.14	4.63	28.00	5.04	29.86	5.49	33.43	6.42	37.14	7.43
	25	18.86	3.35	22.57	4.10	26.14	4.93	28.00	5.39	29.86	5.86	33.43	6.87	37.14	7.95
	27	18.86	3.55	22.57	4.36	26.14	5.26	28.00	5.74	29.86	6.25	33.43	7.33	37.14	8.49
	29	18.86	3.77	22.57	4.63	26.14	5.59	28.00	6.12	29.86	6.65	33.43	7.81	37.14	9.08
	31	18.86	3.98	22.57	4.91	26.14	5.96	28.00	6.50	29.86	7.08	33.43	8.33	37.14	9.67
	33	18.86	4.23	22.57	5.23	26.14	6.34	28.00	6.92	29.86	7.55	33.43	8.88	37.14	10.32
	35	18.86	4.48	22.57	5.54	26.14	6.72	28.00	7.37	29.86	8.03	33.43	9.46	37.14	11.00
	37	18.86	4.73	22.57	5.87	26.14	7.15	28.00	7.81	29.86	8.54	33.43	10.07	37.14	11.71
	39	18.86	5.01	22.57	6.22	26.14	7.58	28.00	8.31	29.86	9.08	33.43	10.70	37.14	12.48
	41	18.86	5.23	22.57	6.44	26.14	7.80	28.00	8.59	29.86	9.35	33.43	11.14	37.14	13.03
	43	18.86	5.66	22.57	6.88	26.14	8.12	28.00	9.05	29.86	9.63	33.43	11.55	37.14	13.43

	45	18.86	5.78	22.57	7.03	26.14	8.30	28.00	9.20	29.86	10.11	33.43	12.17	37.14	13.95
	48	18.86	10.85	22.57	13.17	26.14	15.52	28.00	16.98	29.86	18.33	33.43	22.10	37.14	25.10
60%	-5	16.14	2.29	19.29	2.66	22.43	3.10	24.00	3.30	25.57	3.57	28.71	4.01	31.86	4.59
	-2	16.14	2.31	19.29	2.70	22.43	3.16	24.00	3.35	25.57	3.60	28.71	4.07	31.86	4.62
	0	16.14	2.34	19.29	2.74	22.43	3.20	24.00	3.39	25.57	3.66	28.71	4.13	31.86	4.68
	2	16.14	2.38	19.29	2.80	22.43	3.26	24.00	3.46	25.57	3.71	28.71	4.21	31.86	4.74
	4	16.14	2.45	19.29	2.85	22.43	3.32	24.00	3.50	25.57	3.77	28.71	4.28	31.86	4.81
	6	16.14	2.47	19.29	2.91	22.43	3.38	24.00	3.58	25.57	3.84	28.71	4.36	31.86	4.92
	8	16.14	2.52	19.29	2.95	22.43	3.45	24.00	3.65	25.57	3.92	28.71	4.44	31.86	5.00
	10	16.14	2.57	19.29	3.02	22.43	3.50	24.00	3.75	25.57	4.00	28.71	4.53	31.86	5.08
	12	16.14	2.62	19.29	3.07	22.43	3.57	24.00	3.82	25.57	4.06	28.71	4.61	31.86	5.16
	14	16.14	2.65	19.29	3.12	22.43	3.62	24.00	3.88	25.57	4.15	28.71	4.69	31.86	5.26
	16	16.14	2.69	19.29	3.17	22.43	3.68	24.00	3.95	25.57	4.21	28.71	4.78	31.86	5.36
	18	16.14	2.74	19.29	3.22	22.43	3.75	24.00	4.01	25.57	4.30	28.71	4.86	31.86	5.46
	20	16.14	2.77	19.29	3.28	22.43	3.82	24.00	4.10	25.57	4.38	28.71	4.96	31.86	5.57
	21	16.14	2.80	19.29	3.30	22.43	3.85	24.00	4.13	25.57	4.41	28.71	5.01	31.86	5.62
	23	16.14	2.84	19.29	3.37	22.43	3.91	24.00	4.21	25.57	4.50	28.71	5.21	31.86	5.99
	25	16.14	2.89	19.29	3.42	22.43	4.06	24.00	4.41	25.57	4.78	28.71	5.56	31.86	6.39
	27	16.14	3.00	19.29	3.63	22.43	4.33	24.00	4.71	25.57	5.09	28.71	5.92	31.86	6.82
	29	16.14	3.17	19.29	3.85	22.43	4.61	24.00	5.01	25.57	5.42	28.71	6.32	31.86	7.28
	31	16.14	3.37	19.29	4.08	22.43	4.89	24.00	5.32	25.57	5.77	28.71	6.72	31.86	7.75
	33	16.14	3.55	19.29	4.33	22.43	5.19	24.00	5.66	25.57	6.14	28.71	7.15	31.86	8.26
	35	16.14	3.77	19.29	4.59	22.43	5.51	24.00	6.00	25.57	6.52	28.71	7.61	31.86	8.79
	37	16.14	3.98	19.29	4.86	22.43	5.84	24.00	6.37	25.57	6.92	28.71	8.10	31.86	9.36
	39	16.14	4.20	19.29	5.14	22.43	6.19	24.00	6.75	25.57	7.35	28.71	8.59	31.86	9.95
	41	16.14	4.33	19.29	5.36	22.43	6.41	24.00	7.02	25.57	7.62	28.71	9.00	31.86	10.40
	43	16.14	4.47	19.29	5.59	22.43	6.64	24.00	7.23	25.57	7.88	28.71	9.38	31.86	10.85
	45	16.14	4.68	19.29	5.87	22.43	6.91	24.00	7.50	25.57	8.28	28.71	9.80	31.86	11.45
	48	16.14	6.56	19.29	8.15	22.43	9.46	24.00	10.35	25.57	11.61	28.71	13.43	31.86	16.08
50%	-5	13.50	1.99	16.14	2.30	18.71	2.65	20.00	2.77	21.29	2.92	23.86	3.33	26.57	3.58
	-2	13.50	2.01	16.14	2.35	18.71	2.68	20.00	2.81	21.29	2.98	23.86	3.37	26.57	3.63
	0	13.50	2.04	16.14	2.39	18.71	2.72	20.00	2.85	21.29	3.01	23.86	3.43	26.57	3.69
	2	13.50	2.07	16.14	2.42	18.71	2.77	20.00	2.89	21.29	3.06	23.86	3.44	26.57	3.76
	4	13.50	2.09	16.14	2.46	18.71	2.80	20.00	2.92	21.29	3.12	23.86	3.53	26.57	3.86
	6	13.50	2.13	16.14	2.50	18.71	2.84	20.00	2.99	21.29	3.18	23.86	3.58	26.57	3.97
	8	13.50	2.18	16.14	2.54	18.71	2.89	20.00	3.06	21.29	3.22	23.86	3.64	26.57	4.10
	10	13.50	2.22	16.14	2.57	18.71	2.94	20.00	3.11	21.29	3.32	23.86	3.73	26.57	4.16
	12	13.50	2.24	16.14	2.60	18.71	2.99	20.00	3.17	21.29	3.38	23.86	3.80	26.57	4.23
	14	13.50	2.27	16.14	2.64	18.71	3.02	20.00	3.23	21.29	3.43	23.86	3.87	26.57	4.31
	16	13.50	2.31	16.14	2.67	18.71	3.07	20.00	3.28	21.29	3.48	23.86	3.93	26.57	4.38
	18	13.50	2.34	16.14	2.72	18.71	3.12	20.00	3.33	21.29	3.55	23.86	4.00	26.57	4.46
	20	13.50	2.37	16.14	2.75	18.71	3.17	20.00	3.38	21.29	3.62	23.86	4.06	26.57	4.55
	21	13.50	2.39	16.14	2.79	18.71	3.20	20.00	3.42	21.29	3.65	23.86	4.11	26.57	4.60
	23	13.50	2.42	16.14	2.82	18.71	3.25	20.00	3.48	21.29	3.72	23.86	4.18	26.57	4.69
	25	13.50	2.46	16.14	2.87	18.71	3.32	20.00	3.55	21.29	3.83	23.86	4.40	26.57	5.01
	27	13.50	2.50	16.14	2.99	18.71	3.50	20.00	3.78	21.29	4.06	23.86	4.68	26.57	5.34
	29	13.50	2.64	16.14	3.15	18.71	3.72	20.00	4.01	21.29	4.33	23.86	4.98	26.57	5.69
	31	13.50	2.79	16.14	3.33	18.71	3.93	20.00	4.26	21.29	4.60	23.86	5.29	26.57	6.06
	33	13.50	2.95	16.14	3.53	18.71	4.18	20.00	4.51	21.29	4.88	23.86	5.62	26.57	6.44
	35	13.50	3.12	16.14	3.73	18.71	4.41	20.00	4.78	21.29	5.16	23.86	5.97	26.57	6.83
	37	13.50	3.28	16.14	3.95	18.71	4.68	20.00	5.06	21.29	5.47	23.86	6.34	26.57	7.27
	39	13.50	3.47	16.14	4.16	18.71	4.94	20.00	5.36	21.29	5.81	23.86	6.72	26.57	7.71
	41	13.50	3.61	16.14	4.34	18.71	5.12	20.00	5.61	21.29	6.06	23.86	7.08	26.57	8.07
	43	13.50	3.85	16.14	4.64	18.71	5.30	20.00	5.86	21.29	6.21	23.86	7.44	26.57	8.43
	45	13.50	3.94	16.14	4.76	18.71	5.66	20.00	6.31	21.29	6.47	23.86	8.15	26.57	9.15
	48	13.50	4.17	16.14	5.08	18.71	5.86	20.00	6.55	21.29	6.62	23.86	8.57	26.57	9.56


14HP heating mode

Combination (Capacity index)	Outdoor air temp.		Indoor temperature(°C DB)											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-19.8	-20	29.14	7.91	29.00	8.46	28.86	9.02	28.86	9.30	28.72	9.58	28.72	10.14
	-18.8	-19	29.57	8.08	29.43	8.63	29.43	9.18	29.29	9.46	29.29	9.72	29.14	10.27
	-16.7	-17	30.71	8.46	30.57	8.98	30.43	9.52	30.43	9.78	30.43	10.04	30.29	10.57
	-13.7	-15	32.00	8.85	31.86	9.36	31.71	9.87	31.71	10.11	31.57	10.38	31.57	10.89
	-11.8	-13	33.29	9.24	33.29	9.74	33.14	10.22	33.00	10.46	33.00	10.71	32.86	11.19
	-9.8	-11	34.86	9.65	34.71	10.11	34.57	10.58	34.57	10.81	34.57	11.04	34.43	11.51
	-9.5	-10	35.71	9.85	35.57	10.30	35.43	10.75	35.43	10.99	35.28	11.20	35.28	11.65
	-8.5	-9.1	36.43	10.03	36.29	10.46	36.29	10.91	36.14	11.13	36.14	11.35	36.00	11.80
	-7	-7.6	37.71	10.32	37.71	10.75	37.57	11.18	37.57	11.39	37.43	11.60	37.28	12.03
	-5	-5.6	39.71	10.71	39.57	11.12	39.43	11.52	39.43	11.73	39.29	11.92	39.29	12.32
	-3	-3.7	41.57	11.06	41.43	11.45	41.43	11.83	41.28	12.03	41.28	12.22	41.14	12.60
	0	-0.7	44.85	11.60	44.85	11.96	44.71	12.31	44.71	12.44	44.57	12.67	44.57	13.02
	3	2.2	48.42	12.08	48.29	12.41	48.14	12.75	48.14	12.90	48.14	13.08	48.00	13.40
	5	4.1	50.85	12.38	50.71	12.70	50.71	13.01	50.57	13.17	50.57	13.33	50.43	13.63
	7	6	53.43	12.67	53.28	12.96	53.28	13.27	53.14	13.41	53.14	13.56	51.00	13.02
	9	7.9	56.14	12.93	56.00	13.22	56.00	13.50	55.86	13.65	54.71	13.36	51.00	12.24
120%	11	9.8	59.00	13.20	58.86	13.46	58.57	13.63	56.57	13.09	54.71	12.56	51.00	11.52
	13	11.8	62.14	13.44	62.00	13.70	58.57	12.77	56.57	12.26	54.71	11.79	51.00	10.81
	15	13.7	65.14	13.68	62.28	12.98	58.57	12.03	56.57	11.57	54.71	11.10	51.00	10.20
	-19.8	-20	29.00	8.66	28.86	9.17	28.71	9.69	28.71	9.94	28.71	10.20	28.57	10.72
	-18.8	-19	29.43	8.82	29.29	9.33	29.29	9.84	29.14	10.09	29.14	10.35	29.00	10.86
	-16.7	-17	30.57	9.17	30.43	9.66	30.24	10.14	30.29	10.39	30.29	10.64	30.14	11.12
	-13.7	-15	31.86	9.53	31.72	10.00	31.57	10.46	31.57	10.71	31.57	10.94	31.43	11.41
	-11.8	-13	33.15	9.90	33.15	10.35	33.00	10.80	33.00	11.03	32.86	11.25	32.86	11.70
	-9.8	-11	34.71	10.27	34.57	10.70	34.57	11.13	34.43	11.35	34.43	11.55	34.29	11.99
	-9.5	-10	35.58	10.46	35.43	10.89	35.29	11.29	35.29	11.51	35.29	11.71	35.14	12.13
	-8.5	-9.1	36.29	10.62	36.14	11.03	36.14	11.44	36.00	11.64	36.00	11.86	35.86	12.26
	-7	-7.6	37.57	10.90	37.57	11.29	37.43	11.68	37.43	11.89	37.29	12.08	37.29	12.47
	-5	-5.6	39.57	11.25	39.43	11.63	39.28	12.00	39.28	12.19	39.28	12.38	39.15	12.75
	-3	-3.7	41.43	11.58	41.43	11.95	41.29	12.29	41.29	12.47	41.14	12.66	41.14	13.01
	0	-0.7	44.72	12.08	44.72	12.41	44.57	12.73	44.57	12.91	44.43	13.06	44.43	13.40
	3	2.2	48.29	12.53	48.14	12.83	48.14	13.14	48.00	13.30	48.00	13.44	47.00	13.37
110%	5	4.1	50.72	12.80	50.57	13.09	50.57	13.38	50.43	13.53	50.43	13.68	47.00	12.56
	7	6	53.29	13.06	53.29	13.34	53.15	13.62	52.29	13.43	50.57	12.88	47.00	11.82
	9	7.9	56.00	13.33	55.86	13.59	54.00	13.14	52.29	12.62	50.57	12.11	47.00	11.12
	11	9.8	58.86	13.56	57.43	13.33	54.00	12.35	52.29	11.87	50.57	11.39	47.00	10.48
	13	11.8	61.00	13.43	57.43	12.50	54.00	11.58	52.29	11.15	50.57	10.71	47.00	9.85
	15	13.7	61.00	12.64	57.43	11.77	54.00	10.93	52.29	10.51	50.57	10.10	47.00	9.30
	-19.8	-20	28.86	9.42	28.72	9.88	28.57	10.36	28.57	10.60	28.58	10.83	28.43	11.31
	-18.8	-19	29.29	9.56	29.14	10.03	29.14	10.49	29.14	10.73	29.00	10.96	29.00	11.42
	-16.7	-17	30.43	9.88	30.29	10.33	30.71	10.78	30.14	11.00	30.14	11.23	30.00	11.67
	-13.7	-15	31.72	10.22	31.58	10.65	31.43	11.07	31.43	11.29	31.43	11.51	31.28	11.93
	-11.8	-13	33.00	10.56	33.00	10.97	32.86	11.38	32.86	11.58	32.71	11.79	32.71	12.21
	-9.8	-11	34.57	10.90	34.43	11.29	34.43	11.68	34.28	11.89	34.28	12.08	34.28	12.47
	-9.5	-10	35.43	11.07	35.29	11.45	35.14	11.84	35.14	12.03	35.14	12.22	35.00	12.60
	-8.5	-9.1	36.14	11.22	36.00	11.60	36.00	11.97	35.86	12.16	35.86	12.35	35.86	11.26
	-7	-7.6	37.43	11.48	37.43	11.83	37.29	12.19	37.29	12.38	37.29	12.56	37.14	12.92
	-5	-5.6	39.43	11.80	39.29	12.15	39.14	12.48	39.14	12.66	39.14	12.83	39.00	13.18
	-3	-3.7	41.29	12.11	41.29	12.43	41.14	12.76	41.14	12.92	41.00	13.08	41.00	13.41
	0	-0.7	44.57	12.56	44.57	12.86	44.43	13.17	44.43	13.31	44.43	13.47	43.14	13.21
	3	2.2	48.14	12.98	48.00	13.25	48.00	13.53	47.86	13.66	46.29	13.11	43.14	12.02
	5	4.1	50.57	13.22	50.57	13.50	49.57	13.37	47.86	12.83	46.29	12.32	43.14	11.31
	7	6	53.14	13.47	52.71	13.56	49.57	12.56	47.86	12.06	46.29	11.58	43.14	10.64
	9	7.9	55.86	13.69	52.71	12.74	49.57	11.81	47.86	11.35	46.29	10.90	43.14	10.03
	11	9.8	55.86	12.88	52.71	11.99	49.57	11.12	47.86	10.70	46.29	10.27	43.14	9.46
	13	11.8	55.86	12.08	52.71	11.25	49.57	10.45	47.86	10.06	46.29	9.66	43.14	8.91
	15	13.7	55.86	10.73	52.71	10.61	49.57	9.87	47.86	9.49	46.29	9.14	43.14	8.43

100%	-19.8	-20	28.71	10.17	28.57	10.59	28.57	11.03	28.43	11.25	28.43	11.45	28.29	11.89
	-18.8	-19	29.14	10.30	29.14	10.72	29.00	11.15	29.00	11.36	28.86	11.58	28.86	12.00
	-16.7	-17	30.29	10.59	30.14	11.00	30.14	11.41	30.00	11.61	30.00	11.81	30.00	12.22
	-13.7	-15	31.57	10.90	31.43	11.29	31.28	11.68	31.28	11.89	31.28	12.08	31.14	12.47
	-11.8	-13	32.86	11.22	32.86	11.58	32.72	11.96	32.72	12.15	32.72	12.34	32.57	12.72
	-9.8	-11	34.43	11.52	34.29	11.89	34.29	12.24	34.29	12.43	34.14	12.60	34.14	12.95
	-9.5	-10	35.28	11.68	35.15	12.03	35.15	12.38	35.00	12.56	35.00	12.73	34.86	13.08
	-8.5	-9.1	36.00	11.81	35.86	12.16	35.86	12.50	35.86	12.67	35.72	12.85	35.72	13.18
	-7	-7.6	37.29	12.05	37.29	12.38	37.14	12.70	37.14	12.88	37.14	13.04	37.00	13.37
	-5	-5.6	39.29	12.35	39.14	12.66	39.14	12.98	39.00	13.12	39.00	13.28	38.86	13.60
	-3	-3.7	41.14	12.63	41.14	11.47	41.00	13.22	41.00	13.37	41.00	13.52	39.29	12.95
	0	-0.7	44.43	13.04	44.43	13.31	44.28	13.59	43.57	13.37	42.14	12.82	39.29	11.76
	3	2.2	48.00	13.41	47.86	13.66	45.00	12.64	43.57	12.15	42.14	11.67	39.29	10.71
	5	4.1	50.43	13.66	47.86	12.83	45.00	11.89	43.57	11.44	42.14	10.99	39.29	10.10
	7	6	50.72	12.96	47.86	12.06	45.00	11.19	43.57	10.77	42.14	10.35	39.29	9.52
	9	7.9	50.72	12.18	47.86	11.35	45.00	10.54	43.57	10.01	42.14	9.75	39.29	8.98
	11	9.8	50.72	11.47	47.86	10.70	45.00	9.94	43.57	9.56	42.14	9.20	39.29	8.49
	13	11.8	50.72	10.77	47.86	10.06	45.00	9.36	43.57	9.01	42.14	8.68	39.29	8.01
	15	13.7	50.72	10.16	47.86	9.49	45.00	8.84	43.57	8.52	42.14	8.20	39.29	7.59
90%	-19.8	-20	28.52	10.93	28.38	11.31	28.38	11.70	28.24	11.89	28.24	12.09	28.24	12.47
	-18.8	-19	28.95	11.04	28.95	11.44	28.81	11.81	28.81	12.00	28.81	12.19	28.66	12.57
	-16.7	-17	30.09	11.32	29.95	11.68	29.95	12.05	29.95	12.24	29.80	12.41	29.80	12.77
	-13.7	-15	31.37	11.60	31.23	11.95	31.23	12.29	31.09	12.47	31.09	12.64	31.09	12.99
	-11.8	-13	32.66	11.87	32.66	12.21	32.51	12.54	32.51	12.72	32.51	12.88	32.37	13.21
	-9.8	-11	34.23	12.15	34.23	12.47	34.08	12.79	34.08	12.95	34.08	13.12	33.94	13.44
	-9.5	-10	35.08	12.29	34.94	12.61	34.94	12.92	34.80	13.08	34.80	13.24	34.80	13.54
	-8.5	-9.1	35.79	12.43	35.79	12.73	35.65	13.04	35.65	13.18	35.65	13.34	35.22	13.47
	-7	-7.6	37.08	12.63	37.08	12.92	36.94	13.22	36.94	13.37	36.94	13.51	35.22	12.86
	-5	-5.6	39.07	12.90	38.93	13.18	38.93	13.46	38.79	13.60	37.79	13.18	35.22	12.09
	-3	-3.7	40.93	13.15	40.93	13.41	40.50	13.47	39.07	12.93	37.79	12.41	35.22	11.39
	0	-0.7	44.35	13.53	43.07	13.20	40.50	12.22	39.07	11.74	37.79	11.28	35.22	10.36
	3	2.2	45.64	12.89	43.07	12.00	40.50	11.13	39.07	10.71	37.79	10.29	35.22	9.47
	5	4.1	45.64	12.12	43.07	11.29	40.50	10.49	39.07	10.09	37.79	9.71	35.22	8.94
	7	6	45.64	11.39	43.07	10.64	40.50	9.88	39.07	9.52	37.79	9.16	35.22	8.44
	9	7.9	45.64	10.74	43.07	10.01	40.50	9.31	39.07	8.98	37.79	8.65	35.22	7.98
	11	9.8	45.64	10.11	43.07	9.45	40.50	8.81	39.07	8.49	37.79	8.17	35.22	7.56
	13	11.8	45.64	9.52	43.07	8.91	40.50	8.30	39.07	8.01	37.79	7.72	35.22	7.14
	15	13.7	45.64	9.00	43.07	8.41	40.50	7.86	39.07	7.59	37.79	7.31	35.22	6.77
80%	-19.8	-20	28.43	11.68	28.29	12.02	28.29	12.37	28.29	12.54	28.14	12.72	28.14	13.05
	-18.8	-19	28.86	11.79	28.86	12.13	28.71	12.47	28.71	12.64	28.71	12.80	28.57	13.15
	-16.7	-17	30.00	12.03	29.86	12.35	29.86	12.69	29.86	12.85	29.86	13.01	29.71	13.33
	-13.7	-15	31.28	12.28	31.14	12.58	31.14	12.90	31.14	13.05	31.00	13.21	31.00	13.53
	-11.8	-13	32.57	12.53	32.57	12.83	32.43	13.12	32.43	13.27	32.43	13.43	31.43	13.06
	-9.8	-11	34.14	12.77	34.14	13.06	34.00	13.35	34.00	13.49	33.71	13.46	31.43	12.34
	-9.5	-10	35.00	12.90	34.85	13.18	34.86	13.46	34.86	13.60	33.71	13.06	31.43	11.97
	-8.5	-9.1	35.72	13.02	33.20	13.30	35.57	13.56	34.86	13.25	33.71	12.72	31.43	11.65
	-7	-7.6	37.00	13.21	37.00	13.47	36.00	13.18	34.86	12.66	33.71	12.15	31.43	11.15
	-5	-5.6	39.00	13.44	38.29	13.37	36.00	12.38	34.86	11.90	33.71	11.42	31.43	10.49
	-3	-3.7	40.57	13.52	38.29	12.58	36.00	11.65	34.86	11.22	33.71	10.77	31.43	9.91
	0	-0.7	40.57	12.27	38.29	11.42	36.00	10.61	34.86	10.22	33.71	9.81	31.43	9.04
	3	2.2	40.57	11.17	38.29	10.42	36.00	9.69	34.86	9.33	33.71	8.98	31.43	8.28
	5	4.1	40.57	10.52	38.29	9.82	36.00	9.14	34.86	8.81	33.71	8.49	31.43	7.83
	7	6	40.57	9.91	38.29	9.27	36.00	8.63	34.86	8.33	33.71	8.02	31.43	7.41
	9	7.9	40.57	9.36	38.29	8.75	36.00	8.15	34.86	7.86	33.71	7.59	31.43	7.02
	11	9.8	40.57	8.84	38.29	8.27	36.00	7.72	34.86	7.44	33.71	7.18	31.43	6.66
	13	11.8	40.57	8.33	38.29	7.80	36.00	7.29	34.86	7.03	33.71	6.79	31.43	6.29
	15	13.7	40.57	7.88	38.29	7.40	36.00	6.92	34.86	6.67	33.71	6.44	31.43	5.99
70%	-19.8	-20	28.22	12.44	28.08	12.73	28.08	13.04	28.08	13.18	28.08	13.34	27.37	13.19
	-18.8	-19	28.65	12.54	28.65	12.83	28.51	13.12	28.51	13.27	28.51	13.43	27.37	12.92
	-16.7	-17	29.79	12.74	29.79	13.04	29.65	13.31	29.65	13.46	29.36	11.99	27.37	12.32
	-13.7	-15	31.07	12.96	30.93	13.24	30.93	13.51	30.36	13.31	29.36	12.77	27.37	11.71
	-11.8	-13	32.35	13.18	32.35	13.44	31.50	13.12	30.36	12.61	29.36	12.11	27.37	11.10
	-9.8	-11	33.92	13.40	33.49	13.38	31.50	12.40	30.36	11.92	29.36	11.44	27.37	10.51
	-9.5	-10	34.78	13.51	33.49	12.99	31.50	12.03	30.36	11.57	29.36	11.12	27.37	10.22

	-8.5	-9.1	35.49	13.59	33.49	12.64	31.50	11.71	30.36	11.26	29.36	10.83	27.37	9.95
	-7	-7.6	35.49	12.98	33.49	12.08	31.50	11.20	30.36	10.78	29.36	10.36	27.37	9.53
	-5	-5.6	35.49	12.19	33.49	11.36	31.50	10.55	30.36	10.14	29.36	11.98	27.37	9.00
	-3	-3.7	35.49	11.48	33.49	10.71	31.50	9.95	30.36	9.58	29.36	9.21	27.37	8.50
	0	-0.7	35.49	10.45	33.49	9.77	31.50	9.08	30.36	8.75	29.36	8.43	27.37	7.79
	3	2.2	35.49	9.55	33.49	8.94	31.50	8.33	30.36	8.02	29.36	7.73	27.37	7.15
	5	4.1	35.49	9.01	33.49	8.43	31.50	7.88	30.36	7.59	29.36	7.31	27.37	6.77
	7	6	35.49	8.52	33.49	7.98	31.50	7.44	30.36	7.18	29.36	6.93	27.37	6.42
	9	7.9	35.49	8.05	33.49	7.54	31.50	7.05	30.36	6.80	29.36	6.57	27.37	6.09
	11	9.8	35.49	7.61	33.49	7.14	31.50	6.68	30.36	6.45	29.36	6.23	27.37	5.78
	13	11.8	35.49	7.19	33.49	6.76	31.50	6.32	30.36	6.12	29.36	5.90	27.37	5.49
	15	13.7	35.49	6.82	33.49	6.41	31.50	6.00	30.36	5.81	29.36	5.61	27.37	5.23
60%	-19.8	-20	28.14	13.19	28.00	13.44	27.00	12.93	26.14	12.42	25.29	11.93	23.57	10.94
	-18.8	-19	28.57	13.28	28.57	13.53	27.00	12.66	26.14	12.16	25.29	11.67	23.57	10.71
	-16.7	-17	29.71	13.46	28.71	13.03	27.00	12.08	26.14	11.61	25.29	11.15	23.57	10.24
	-13.7	-15	30.43	13.31	28.71	12.38	27.00	11.48	26.14	11.04	25.29	10.61	23.57	9.75
	-11.8	-13	30.43	12.60	28.71	11.73	27.00	10.88	26.14	10.48	25.29	10.07	23.57	9.31
	-9.8	-11	30.43	11.90	28.71	11.09	27.00	10.30	26.14	9.91	25.29	9.53	23.57	8.79
	-9.5	-10	30.43	11.57	28.71	10.78	27.00	10.01	26.14	9.65	25.29	9.27	23.57	8.54
	-8.5	-9.1	30.43	11.26	28.71	10.51	27.00	9.77	26.14	9.40	25.29	9.04	23.57	8.34
	-7	-7.6	30.43	10.77	28.71	10.06	27.00	9.34	26.14	9.01	25.29	8.66	23.57	8.01
	-5	-5.6	30.43	10.14	28.71	9.47	27.00	8.82	26.14	8.50	25.29	8.18	23.57	7.57
	-3	-3.7	30.43	9.58	28.71	8.95	27.00	8.34	26.14	8.05	25.29	7.75	23.57	7.16
	0	-0.7	30.43	8.75	28.71	8.20	27.00	7.64	26.14	7.38	25.29	7.11	23.57	6.58
	3	2.2	30.43	8.02	28.71	7.53	27.00	7.03	26.14	6.79	25.29	6.55	23.57	6.07
	5	4.1	30.43	7.59	28.71	7.12	27.00	6.66	26.14	6.44	25.29	6.21	23.57	5.77
	7	6	30.43	7.18	28.71	6.74	27.00	6.31	26.14	6.10	25.29	5.90	23.57	5.48
	9	7.9	30.43	6.80	28.71	6.39	27.00	5.99	26.14	5.80	25.29	5.59	23.57	5.22
	11	9.8	30.43	6.45	28.71	6.07	27.00	5.70	26.14	5.51	25.29	5.32	23.57	4.97
	13	11.8	30.43	6.10	28.71	5.75	27.00	5.41	26.14	5.23	25.29	5.06	23.57	4.72
	15	13.7	30.43	5.81	28.71	5.46	27.00	5.14	26.14	4.98	25.29	4.82	23.57	4.50
50%	-19.8	-20	25.35	12.00	23.92	11.17	22.50	10.38	21.65	10.00	20.93	9.61	19.51	8.85
	-18.8	-19	25.35	11.74	23.92	10.94	22.50	10.17	21.65	9.78	20.93	9.40	19.51	8.68
	-16.7	-17	25.35	11.20	23.92	10.45	22.50	9.72	21.65	9.36	20.93	9.01	19.51	8.31
	-13.7	-15	25.35	10.67	23.92	9.95	22.50	9.26	21.65	8.92	20.93	8.59	19.51	7.93
	-11.8	-13	25.35	10.13	23.92	9.46	22.50	8.81	21.65	8.49	20.93	8.17	19.51	7.56
	-9.8	-11	25.35	9.59	23.92	8.97	22.50	8.36	21.65	8.05	20.93	7.76	19.51	7.18
	-9.5	-10	25.35	9.33	23.92	8.72	22.50	8.14	21.65	7.85	20.93	7.56	19.51	6.99
	-8.5	-9.1	25.35	9.10	23.92	8.52	22.50	7.93	21.65	7.66	20.93	7.38	19.51	6.83
	-7	-7.6	25.35	8.72	23.92	8.17	22.50	7.61	21.65	7.35	20.93	7.09	19.51	6.57
	-5	-5.6	25.35	8.23	23.92	7.72	22.50	7.21	21.65	6.96	20.93	6.71	19.51	6.22
	-3	-3.7	25.35	7.79	23.92	7.31	22.50	6.83	21.65	6.60	20.93	6.36	19.51	5.91
	0	-0.7	25.35	7.15	23.92	6.71	22.50	6.29	21.65	6.07	20.93	5.87	19.51	5.46
	3	2.2	25.35	6.58	23.92	6.19	22.50	5.80	21.65	5.61	20.93	5.42	19.51	5.06
	5	4.1	25.35	6.25	23.92	5.87	22.50	5.51	21.65	5.33	20.93	5.16	19.51	4.81
	7	6	25.35	5.93	23.92	5.58	22.50	5.25	21.65	5.07	20.93	4.91	19.51	4.59
	9	7.9	25.35	5.62	23.92	5.30	22.50	4.98	21.65	4.84	20.93	4.68	19.51	4.37
	11	9.8	25.35	5.35	23.92	5.04	22.50	4.75	21.65	4.61	20.93	4.46	19.51	4.17
	13	11.8	25.35	5.09	23.92	4.80	22.50	4.52	21.65	4.39	20.93	4.24	19.51	3.98
	15	13.7	25.35	4.84	23.92	4.58	22.50	4.32	21.65	4.19	20.93	4.05	19.51	3.81

Note:

- 1,  is shown as reference
- 2, In cooling mode, avoid the outdoor air temperature range from 42-48 degree C, when selecting the models
In heating mode, avoid the outdoor air temperature range from -15 to -20 degree C, when selecting the models
- 3, The above table shows the average value of conditions may operate
- 4, It is recommended to connect less than 130%

16HP cooling mode

Combination (%) (Capacity index)	Outdoor temperature (°C DB)	Indoor temperature(° C DB/WD)													
		DB:20.8,WB:14		DB:23.3,WB:16		DB:25.8,WB:18		DB:27,WB:19		DB:28.2,WB:20		DB:30.7,WB:22		DB:32,WB:24	
		TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
		kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
130%	-5	39.54	5.73	47.09	6.99	54.64	7.50	56.73	7.80	59.46	8.02	60.91	8.73	62.44	8.78
	-2	39.54	5.73	47.09	7.13	54.64	7.50	56.73	7.85	59.46	8.02	60.91	8.84	62.44	8.87
	0	39.54	5.83	47.09	7.25	54.64	7.77	56.73	8.28	59.46	8.49	60.91	8.94	62.44	8.99
	2	39.54	5.93	47.09	7.27	54.64	8.04	56.73	8.75	59.46	8.59	60.91	9.01	62.44	9.12
	4	39.54	6.07	47.09	7.41	54.64	8.32	56.73	8.78	59.46	8.70	60.91	9.00	62.44	9.30
	6	39.54	6.18	47.09	7.56	54.64	8.62	56.73	8.86	58.80	8.97	60.16	9.00	61.75	9.36
	8	39.54	6.33	47.09	7.73	54.64	9.06	56.73	9.29	58.07	9.26	59.51	3.90	60.97	9.45
	10	39.54	6.46	47.09	7.90	54.64	9.39	56.73	9.60	57.37	4.04	58.82	4.06	60.27	9.73
	12	39.54	6.58	47.09	8.05	54.64	9.58	55.93	4.03	56.73	4.06	58.02	4.07	59.46	9.79
	14	39.54	6.71	47.09	8.20	54.48	4.05	55.29	4.06	55.93	4.08	57.37	4.09	58.82	10.01
	16	39.54	6.82	47.09	8.37	53.84	4.06	54.48	4.08	55.12	4.10	56.57	4.12	58.02	10.17
	18	39.54	6.95	47.09	8.54	53.04	10.01	53.68	10.07	54.48	10.13	55.93	10.22	57.37	10.32
	20	39.54	7.11	47.09	9.09	52.23	10.51	53.04	10.56	53.68	10.62	55.12	10.71	56.57	10.83
	21	39.54	7.29	47.09	9.41	51.91	10.75	52.71	10.81	53.35	10.87	54.80	10.98	56.25	11.07
	23	39.54	7.82	47.09	10.09	51.27	11.24	51.91	11.30	52.55	11.36	54.00	11.47	55.44	11.58
	25	39.54	8.35	47.09	10.81	50.46	11.73	51.10	11.79	51.91	11.87	53.35	11.98	54.80	12.09
	27	39.54	8.92	47.09	11.57	49.82	12.23	50.46	12.30	51.10	12.36	52.55	12.49	54.00	12.62
	29	39.54	9.52	47.09	12.36	49.02	12.72	49.66	12.79	50.46	12.87	51.91	13.00	53.35	13.13
	31	39.54	10.17	46.93	13.08	48.21	13.23	49.02	13.30	49.66	13.36	51.10	13.51	52.55	13.66
	33	39.54	10.83	46.12	13.57	47.57	13.72	48.21	13.79	49.02	13.87	50.46	14.02	51.75	14.17
120%	35	39.54	11.55	45.32	14.06	46.77	14.23	47.57	14.30	48.21	14.38	49.66	14.55	51.10	14.70
	37	39.54	12.28	44.68	14.57	46.12	14.74	46.77	14.82	47.57	14.91	48.85	15.08	50.30	15.25
	39	39.54	13.08	43.87	14.72	45.32	15.23	46.12	15.32	46.77	15.42	48.21	15.59	49.66	15.78
	41	39.54	13.76	43.42	14.86	44.84	15.37	45.65	15.47	46.29	15.56	47.74	15.62	47.76	15.92
	43	39.54	14.11	43.10	14.94	44.61	15.42	45.41	15.54	45.81	15.58	46.87	15.65	47.19	15.96
	45	39.54	14.81	42.83	15.08	44.13	15.56	44.93	15.64	45.15	15.65	45.60	15.71	46.26	16.26
	48	39.54	11.99	44.36	11.56	48.11	11.98	49.00	11.88	49.40	11.94	49.18	11.93	50.08	12.88
	-5	36.48	5.54	43.39	6.70	50.47	7.93	54.00	8.65	56.57	9.01	57.86	9.30	59.14	9.55
	-2	36.48	5.59	43.39	6.77	50.47	8.01	54.00	8.70	56.57	9.12	57.86	9.38	59.14	9.58
	0	36.48	5.64	43.39	6.82	50.47	8.10	54.00	8.72	56.57	9.20	57.86	9.43	59.14	9.60
	2	36.48	5.66	43.39	6.89	50.47	8.16	54.00	8.80	56.57	9.24	57.86	9.50	59.14	9.62
	4	36.48	5.71	43.39	6.98	50.47	8.27	54.00	8.88	56.57	9.36	57.86	9.52	59.14	9.65
	6	36.48	5.77	43.39	7.03	50.47	8.37	54.00	8.98	56.57	9.46	57.86	9.60	59.14	9.68
	8	36.48	5.83	43.39	7.10	50.47	8.48	54.00	9.09	56.57	9.56	57.86	9.63	59.14	9.72
	10	36.48	5.90	43.39	7.20	50.47	8.56	54.00	9.26	56.57	9.56	57.86	9.66	59.14	9.77
	12	36.48	6.01	43.39	7.33	50.47	8.73	54.00	9.43	55.77	9.60	57.05	9.61	58.34	9.83
	14	36.48	6.12	43.39	7.48	50.47	8.90	54.00	9.62	54.96	9.66	56.41	9.75	57.69	9.95
	16	36.48	6.24	43.39	7.63	50.47	9.07	53.68	4.10	54.32	9.80	55.61	9.92	56.89	10.10
	18	36.48	6.35	43.39	7.79	50.47	9.37	52.88	10.01	53.52	10.05	54.80	10.15	56.25	10.24
	20	36.48	6.48	43.39	8.09	50.47	10.09	52.23	10.51	52.88	10.54	54.16	10.64	55.45	10.73
	21	36.48	6.54	43.39	8.37	50.47	10.45	51.75	10.75	52.39	10.79	53.84	10.88	55.13	11.00
110%	23	36.48	6.99	43.39	8.97	50.47	11.19	51.11	11.22	51.75	11.28	53.03	11.39	54.32	11.49
	25	36.48	7.46	43.39	9.60	49.66	11.68	50.30	11.72	50.95	11.77	52.39	11.88	53.68	12.00
	27	36.48	7.97	43.39	10.26	49.02	12.15	49.66	12.23	50.30	12.28	51.59	12.39	52.88	12.51
	29	36.48	8.50	43.39	10.96	48.21	12.64	48.86	12.72	49.50	12.77	50.79	12.90	52.23	13.02
	31	36.48	9.07	43.39	11.70	47.41	13.15	48.21	13.21	48.86	13.28	50.14	13.41	51.43	13.55
	33	36.48	9.66	43.39	12.47	46.76	13.64	47.41	13.72	48.05	13.77	49.34	13.93	50.62	14.06
	35	36.48	10.28	43.39	13.30	45.96	14.13	46.61	14.21	47.41	14.28	48.69	14.44	49.98	14.59
	37	36.48	10.94	43.39	14.17	45.32	14.64	45.96	14.72	46.61	14.79	47.89	14.95	49.18	15.12
	39	36.48	11.64	43.23	14.97	44.52	15.14	45.16	15.23	45.80	15.31	47.25	15.48	48.54	15.63
	41	36.48	11.96	42.88	15.07	44.17	15.24	44.81	15.34	45.46	15.41	46.90	15.52	47.14	15.74
	43	36.48	12.14	42.65	15.18	43.82	15.33	44.46	15.39	45.11	15.47	46.08	15.56	46.41	16.06
	45	36.48	12.28	42.42	15.32	43.40	15.48	44.00	15.54	44.71	15.59	45.15	15.61	45.94	16.41
	48	42.27	7.99	48.73	9.94	49.64	10.07	50.16	10.18	51.23	10.17	51.50	10.03	52.53	10.64
	-5	33.43	4.83	39.86	6.02	46.29	7.18	49.50	7.71	52.71	8.29	56.73	8.61	58.02	8.88
	-2	33.43	4.93	39.86	6.10	46.29	7.24	49.50	7.78	52.71	8.36	56.73	8.70	58.02	8.93
	0	33.43	4.98	39.86	6.13	46.29	7.30	49.50	7.83	52.71	8.45	56.73	8.78	58.02	9.03
	2	33.43	5.08	39.86	6.19	46.29	7.41	49.50	7.92	52.71	8.54	56.73	8.91	58.02	9.15
	4	33.43	5.19	39.86	6.26	46.29	7.48	49.50	8.02	52.71	8.67	56.73	9.03	58.02	9.23

	6	33.43	5.24	39.86	6.33	46.29	7.55	49.50	8.14	52.71	8.77	56.73	9.13	58.02	9.37
	8	33.43	5.28	39.86	6.43	46.29	7.64	49.50	8.23	52.71	8.87	56.73	9.19	58.02	9.47
	10	33.43	5.35	39.86	6.52	46.29	7.75	49.50	8.37	52.71	9.01	56.73	9.26	58.02	9.55
	12	33.43	5.46	39.86	6.65	46.29	7.90	49.50	8.54	52.71	9.18	56.09	9.39	57.22	9.68
	14	33.43	5.56	39.86	6.77	46.29	8.05	49.50	8.69	52.71	9.35	55.29	9.47	56.57	9.75
	16	33.43	5.65	39.86	6.90	46.29	8.20	49.50	8.86	52.71	9.54	54.65	9.58	55.77	9.85
	18	33.43	5.76	39.86	7.03	46.29	8.37	49.50	9.11	52.71	10.00	53.84	10.07	55.13	10.17
	20	33.43	5.88	39.86	7.18	46.29	8.86	49.50	9.79	51.91	10.49	53.20	10.56	54.33	10.66
	21	33.43	5.93	39.86	7.39	46.29	9.18	49.50	10.15	51.59	10.73	52.72	10.81	54.00	10.90
	23	33.43	6.22	39.86	7.92	46.29	9.85	49.50	10.88	50.79	11.20	52.08	11.32	53.20	11.41
	25	33.43	6.63	39.86	8.46	46.29	10.52	49.50	11.66	50.14	11.70	51.27	11.81	52.55	11.90
	27	33.43	7.07	39.86	9.05	46.29	11.26	48.70	12.15	49.34	12.19	50.63	12.30	51.75	12.41
	29	33.43	7.54	39.86	9.66	46.29	12.04	48.05	12.64	48.70	12.70	49.82	12.81	51.11	12.93
	31	33.43	8.03	39.86	10.30	46.29	12.85	47.25	13.13	47.89	13.19	49.18	13.30	50.30	13.43
	33	33.43	8.54	39.86	10.98	45.97	13.55	46.61	13.62	47.25	13.68	48.38	13.81	49.66	13.95
	35	33.43	9.09	39.86	11.70	45.16	14.04	45.81	14.12	46.45	14.19	47.57	14.32	48.86	14.46
	37	33.43	9.67	39.86	12.45	44.52	14.55	45.16	14.61	45.65	14.68	46.93	14.83	48.05	14.97
	39	33.43	10.28	39.86	13.27	43.72	15.04	44.36	15.12	45.00	15.19	46.13	15.34	47.41	15.49
	41	33.43	10.38	39.86	13.37	43.37	15.15	44.01	15.22	44.66	15.30	45.54	15.45	45.98	15.60
	43	33.43	10.49	39.86	13.54	43.03	15.25	43.67	15.33	44.32	15.40	45.13	15.51	45.28	15.92
	45	33.43	10.83	39.86	13.62	42.59	15.39	43.21	15.51	43.92	15.55	44.68	15.93	44.86	16.29
	48	36.61	8.00	43.65	9.97	45.97	11.25	46.57	11.43	47.56	11.36	48.12	12.36	48.49	11.93
100%	-5	30.38	4.40	36.16	5.30	42.11	6.31	45.00	6.76	47.89	7.33	53.84	8.36	56.89	8.72
	-2	30.38	4.46	36.16	5.37	42.11	6.38	45.00	6.88	47.89	7.43	53.84	8.45	56.89	8.78
	0	30.38	4.50	36.16	5.43	42.11	6.45	45.00	6.97	47.89	7.50	53.84	8.59	56.89	8.87
	2	30.38	4.59	36.16	5.50	42.11	6.52	45.00	7.06	47.89	7.58	53.84	8.72	56.89	9.01
	4	30.38	4.62	36.16	5.55	42.11	6.62	45.00	7.16	47.89	7.68	53.84	8.80	56.89	9.11
	6	30.38	4.69	36.16	5.66	42.11	6.70	45.00	7.29	47.89	7.80	53.84	8.93	56.89	9.25
	8	30.38	4.78	36.16	5.75	42.11	6.82	45.00	7.37	47.89	7.92	53.84	9.07	56.89	9.41
	10	30.38	4.84	36.16	5.86	42.11	6.93	45.00	7.50	47.89	8.07	53.84	9.22	56.89	9.54
	12	30.38	4.91	36.16	5.97	42.11	7.07	45.00	7.63	47.89	8.22	53.84	9.39	56.09	9.62
	14	30.38	5.01	36.16	6.08	42.11	7.20	45.00	7.79	47.89	8.37	53.84	9.58	55.44	9.73
	16	30.38	5.10	36.16	6.20	42.11	7.35	45.00	7.94	47.89	8.54	53.52	9.69	54.64	9.84
	18	30.38	5.20	36.16	6.31	42.11	7.48	45.00	8.09	47.89	8.71	52.88	10.01	54.00	10.09
	20	30.38	5.29	36.16	6.44	42.11	7.71	45.00	8.50	47.89	9.33	52.07	10.49	53.19	10.58
	21	30.38	5.35	36.16	6.50	42.11	7.99	45.00	8.80	47.89	9.66	51.75	10.73	52.88	10.83
	23	30.38	5.48	36.16	6.93	42.11	8.56	45.00	9.43	47.89	10.35	51.11	11.22	52.07	11.32
	25	30.38	5.84	36.16	7.41	42.11	9.16	45.00	10.11	47.89	11.09	50.31	11.72	51.43	11.81
	27	30.38	6.23	36.16	7.90	42.11	9.79	45.00	10.81	47.89	11.87	49.50	12.21	50.63	12.32
	29	30.38	6.63	36.16	8.43	42.11	10.45	45.00	11.55	47.73	12.60	48.86	12.72	49.98	12.81
	31	30.38	7.07	36.16	8.99	42.11	11.15	45.00	12.32	47.09	13.09	48.06	13.21	49.18	13.32
	33	30.38	7.50	36.16	9.58	42.11	11.88	45.00	13.15	46.29	13.59	47.41	13.70	48.54	13.83
	35	30.38	7.97	36.16	10.18	42.11	12.68	45.00	14.02	45.48	14.08	46.61	14.21	47.73	14.32
	37	30.38	8.48	36.16	10.85	42.11	13.51	44.19	14.51	44.84	14.59	45.96	14.72	46.93	14.83
	39	30.38	9.01	36.16	11.53	42.11	14.38	43.55	15.00	44.03	15.08	45.16	15.21	46.29	15.36
	41	30.38	9.43	36.16	11.95	42.11	14.90	42.88	15.11	43.70	15.31	44.38	15.57	45.61	15.68
	43	30.38	9.85	36.16	12.37	42.11	15.18	42.20	15.28	43.38	15.46	44.64	15.67	44.81	15.85
	45	30.38	10.41	36.16	12.93	42.11	15.44	41.30	15.49	43.16	15.74	44.26	15.91	43.91	16.06
	48	31.46	10.94	37.45	13.38	43.61	15.47	41.01	15.26	44.63	15.91	43.05	15.87	44.48	16.02
90%	-5	27.32	3.89	32.63	4.67	37.93	5.51	40.50	6.01	43.07	6.40	48.37	7.35	53.68	8.42
	-2	27.32	3.93	32.63	4.72	37.93	5.58	40.50	6.10	43.07	6.47	48.37	7.43	53.68	8.50
	0	27.32	3.99	32.63	4.78	37.93	5.67	40.50	6.17	43.07	6.56	48.37	7.51	53.68	8.57
	2	27.32	4.05	32.63	4.84	37.93	5.73	40.50	6.26	43.07	6.66	48.37	7.67	53.68	8.70
	4	27.32	4.11	32.63	4.91	37.93	5.82	40.50	6.35	43.07	6.74	48.37	7.79	53.68	8.82
	6	27.32	4.17	32.63	5.01	37.93	5.93	40.50	6.47	43.07	6.86	48.37	7.91	53.68	8.97
	8	27.32	4.25	32.63	5.10	37.93	6.05	40.50	6.55	43.07	6.98	48.37	8.05	53.68	9.06
	10	27.32	4.33	32.63	5.21	37.93	6.16	40.50	6.65	43.07	7.14	48.37	8.16	53.68	9.20
	12	27.32	4.40	32.63	5.31	37.93	6.27	40.50	6.76	43.07	7.27	48.37	8.31	53.68	9.37
	14	27.32	4.48	32.63	5.40	37.93	6.39	40.50	6.90	43.07	7.41	48.37	8.46	53.68	9.54
	16	27.32	4.55	32.63	5.50	37.93	6.52	40.50	7.03	43.07	7.56	48.37	8.63	53.52	9.71
	18	27.32	4.63	32.63	5.61	37.93	6.63	40.50	7.16	43.07	7.71	48.37	8.80	52.88	10.01
	20	27.32	4.72	32.63	5.74	37.93	6.76	40.50	7.31	43.07	7.99	48.37	9.47	52.07	10.49
	21	27.32	4.76	32.63	5.78	37.93	6.88	40.50	7.56	43.07	8.28	48.37	9.81	51.75	10.73
	23	27.32	4.86	32.63	6.01	37.93	7.37	40.50	8.11	43.07	8.88	48.37	10.52	50.94	11.22

	25	27.32	5.12	32.63	6.42	37.93	7.88	40.50	8.67	43.07	9.48	48.37	11.26	50.31	11.71
	27	27.32	5.44	32.63	6.84	37.93	8.41	40.50	9.26	43.07	10.15	48.37	12.05	49.50	12.21
	29	27.32	5.80	32.63	7.29	37.93	8.97	40.50	9.88	43.07	10.85	47.89	12.60	48.86	12.70
	31	27.32	6.16	32.63	7.77	37.93	9.56	40.50	10.54	43.07	11.56	47.09	13.09	48.05	13.21
	33	27.32	6.54	32.63	8.26	37.93	10.20	40.50	11.24	43.07	12.34	46.45	13.60	47.41	13.70
	35	27.32	6.95	32.63	8.79	37.93	10.86	40.50	11.98	43.07	13.15	45.64	14.10	46.61	14.21
	37	27.32	7.37	32.63	9.33	37.93	11.56	40.50	12.75	43.07	14.02	44.84	14.59	45.96	14.70
	39	27.32	7.82	32.63	9.94	37.93	12.30	40.50	13.59	43.07	14.93	44.20	15.10	45.16	15.21
	41	27.32	8.09	32.63	10.39	37.93	12.75	40.50	13.94	43.07	15.02	43.89	15.48	44.86	15.57
	43	27.32	8.48	32.63	10.84	37.93	13.20	40.50	14.30	43.07	15.34	43.66	15.68	44.47	15.81
	45	27.32	9.02	32.63	11.38	37.93	13.74	40.50	14.78	43.07	15.76	43.42	15.85	43.79	16.02
	48	27.32	6.91	32.63	8.58	37.93	10.26	40.50	11.00	43.07	11.47	47.84	11.44	47.34	11.56
80%	-5	24.27	3.43	28.93	4.06	33.59	4.80	36.00	5.11	38.41	5.50	43.07	6.36	47.73	7.25
	-2	24.27	3.48	28.93	4.11	33.59	4.84	36.00	5.19	38.41	5.55	43.07	6.42	47.73	7.33
	0	24.27	3.54	28.93	4.16	33.59	4.90	36.00	5.25	38.41	5.65	43.07	6.51	47.73	7.43
	2	24.27	3.61	28.93	4.22	33.59	4.97	36.00	5.35	38.41	5.75	43.07	6.64	47.73	7.57
	4	24.27	3.67	28.93	4.29	33.59	5.07	36.00	5.47	38.41	5.85	43.07	6.76	47.73	7.67
	6	24.27	3.73	28.93	4.39	33.59	5.15	36.00	5.59	38.41	5.96	43.07	6.86	47.73	7.80
	8	24.27	3.80	28.93	4.49	33.59	5.27	36.00	5.68	38.41	6.09	43.07	6.96	47.73	7.95
	10	24.27	3.84	28.93	4.59	33.59	5.40	36.00	5.82	38.41	6.24	43.07	7.12	47.73	8.03
	12	24.27	3.89	28.93	4.67	33.59	5.50	36.00	5.93	38.41	6.37	43.07	7.26	47.73	8.18
	14	24.27	3.97	28.93	4.76	33.59	5.59	36.00	6.03	38.41	6.48	43.07	7.39	47.73	8.33
	16	24.27	4.02	28.93	4.84	33.59	5.71	36.00	6.14	38.41	6.59	43.07	7.54	47.73	8.48
	18	24.27	4.10	28.93	4.93	33.59	5.82	36.00	6.27	38.41	6.73	43.07	7.69	47.73	8.65
	20	24.27	4.18	28.93	5.03	33.59	5.93	36.00	6.39	38.41	6.86	43.07	7.97	47.73	9.26
	21	24.27	4.21	28.93	5.06	33.59	5.99	36.00	6.46	38.41	7.01	43.07	8.26	47.73	9.60
	23	24.27	4.29	28.93	5.18	33.59	6.27	36.00	6.88	38.41	7.50	43.07	8.84	47.73	10.30
	25	24.27	4.42	28.93	5.50	33.59	6.71	36.00	7.35	38.41	8.01	43.07	9.47	47.73	11.02
	27	24.27	4.71	28.93	5.86	33.59	7.14	36.00	7.84	38.41	8.56	43.07	10.11	47.73	11.79
	29	24.27	5.01	28.93	6.24	33.59	7.62	36.00	8.35	38.41	9.15	43.07	10.79	47.73	12.60
	31	24.27	5.31	28.93	6.63	33.59	8.11	36.00	8.90	38.41	9.75	43.07	11.53	46.93	13.10
	33	24.27	5.65	28.93	7.05	33.59	8.64	36.00	9.49	38.41	10.37	43.07	12.28	46.29	13.59
	35	24.27	5.99	28.93	7.50	33.59	9.18	36.00	10.09	38.41	11.05	43.07	13.10	45.48	14.08
	37	24.27	6.35	28.93	7.95	33.59	9.77	36.00	10.75	38.41	11.77	43.07	13.96	44.84	14.57
	39	24.27	6.73	28.93	8.48	33.59	10.39	36.00	11.43	38.41	12.53	43.07	14.87	44.04	15.08
	41	24.27	6.88	28.93	8.56	33.59	10.54	36.00	11.73	38.41	12.76	43.07	15.25	43.77	15.34
	43	24.27	7.08	28.93	8.64	33.59	10.70	36.00	11.94	38.41	12.93	43.07	15.43	43.50	15.51
	45	24.27	7.28	28.93	8.74	33.59	10.90	36.00	12.19	38.41	13.16	43.07	15.60	42.96	15.76
	48	24.27	4.77	28.93	5.70	37.79	7.19	36.00	8.11	38.41	8.67	43.07	10.23	47.92	10.45
70%	-5	21.22	3.06	25.39	3.59	29.41	4.07	31.50	4.36	33.59	4.66	37.61	5.33	41.78	6.12
	-2	21.22	3.09	25.39	3.61	29.41	4.09	31.50	4.45	33.59	4.74	37.61	5.41	41.78	6.21
	0	21.22	3.10	25.39	3.66	29.41	4.18	31.50	4.53	33.59	4.82	37.61	5.52	41.78	6.29
	2	21.22	3.12	25.39	3.67	29.41	4.25	31.50	4.61	33.59	4.91	37.61	5.64	41.78	6.39
	4	21.22	3.16	25.39	3.77	29.41	4.34	31.50	4.70	33.59	5.02	37.61	5.73	41.78	6.54
	6	21.22	3.21	25.39	3.83	29.41	4.45	31.50	4.85	33.59	5.13	37.61	5.83	41.78	6.67
	8	21.22	3.27	25.39	3.94	29.41	4.55	31.50	4.92	33.59	5.24	37.61	6.00	41.78	6.80
	10	21.22	3.34	25.39	4.01	29.41	4.67	31.50	5.03	33.59	5.39	37.61	6.12	41.78	6.88
	12	21.22	3.42	25.39	4.06	29.41	4.76	31.50	5.12	33.59	5.48	37.61	6.24	41.78	7.01
	14	21.22	3.48	25.39	4.14	29.41	4.84	31.50	5.20	33.59	5.57	37.61	6.35	41.78	7.14
	16	21.22	3.53	25.39	4.21	29.41	4.93	31.50	5.31	33.59	5.69	37.61	6.46	41.78	7.27
	18	21.22	3.59	25.39	4.29	29.41	5.03	31.50	5.40	33.59	5.78	37.61	6.59	41.78	7.43
	20	21.22	3.65	25.39	4.37	29.41	5.12	31.50	5.50	33.59	5.90	37.61	6.73	41.78	7.63
	21	21.22	3.68	25.39	4.40	29.41	5.16	31.50	5.56	33.59	5.95	37.61	6.82	41.78	7.90
	23	21.22	3.74	25.39	4.48	29.41	5.27	31.50	5.74	33.59	6.25	37.61	7.31	41.78	8.47
	25	21.22	3.82	25.39	4.67	29.41	5.61	31.50	6.14	33.59	6.67	37.61	7.82	41.78	9.05
	27	21.22	4.04	25.39	4.97	29.41	5.99	31.50	6.54	33.59	7.12	37.61	8.35	41.78	9.67
	29	21.22	4.29	25.39	5.27	29.41	6.37	31.50	6.97	33.59	7.58	37.61	8.90	41.78	10.34
	31	21.22	4.53	25.39	5.59	29.41	6.78	31.50	7.41	33.59	8.07	37.61	9.49	41.78	11.02
	33	21.22	4.82	25.39	5.95	29.41	7.22	31.50	7.88	33.59	8.60	37.61	10.11	41.78	11.75
	35	21.22	5.10	25.39	6.31	29.41	7.65	31.50	8.39	33.59	9.15	37.61	10.77	41.78	12.53
	37	21.22	5.39	25.39	6.69	29.41	8.14	31.50	8.90	33.59	9.73	37.61	11.47	41.78	13.34
	39	21.22	5.71	25.39	7.09	29.41	8.64	31.50	9.47	33.59	10.34	37.61	12.19	41.78	14.21
	41	21.22	5.96	25.39	7.34	29.41	8.89	31.50	9.78	33.59	10.65	37.61	12.69	41.78	14.84
	43	21.22	6.44	25.39	7.84	29.41	9.25	31.50	10.31	33.59	10.97	37.61	13.15	41.78	15.30

	45	21.22	6.59	25.39	8.01	29.41	9.45	31.50	10.47	33.59	11.51	37.61	13.87	41.78	15.89
	48	21.22	12.36	25.39	15.00	29.41	17.68	31.50	19.34	33.59	20.87	37.61	25.17	41.78	28.59
60%	-5	18.16	2.61	21.70	3.03	25.23	3.53	27.00	3.76	28.77	4.06	32.30	4.56	35.84	5.23
	-2	18.16	2.63	21.70	3.08	25.23	3.60	27.00	3.82	28.77	4.10	32.30	4.63	35.84	5.27
	0	18.16	2.67	21.70	3.12	25.23	3.64	27.00	3.86	28.77	4.17	32.30	4.70	35.84	5.33
	2	18.16	2.72	21.70	3.19	25.23	3.71	27.00	3.94	28.77	4.23	32.30	4.79	35.84	5.40
	4	18.16	2.79	21.70	3.25	25.23	3.78	27.00	3.99	28.77	4.29	32.30	4.87	35.84	5.48
	6	18.16	2.82	21.70	3.31	25.23	3.85	27.00	4.08	28.77	4.38	32.30	4.97	35.84	5.61
	8	18.16	2.87	21.70	3.36	25.23	3.93	27.00	4.15	28.77	4.47	32.30	5.06	35.84	5.70
	10	18.16	2.93	21.70	3.44	25.23	3.99	27.00	4.27	28.77	4.55	32.30	5.16	35.84	5.78
	12	18.16	2.99	21.70	3.49	25.23	4.06	27.00	4.35	28.77	4.63	32.30	5.25	35.84	5.88
	14	18.16	3.02	21.70	3.55	25.23	4.12	27.00	4.42	28.77	4.72	32.30	5.35	35.84	5.99
	16	18.16	3.06	21.70	3.61	25.23	4.19	27.00	4.50	28.77	4.80	32.30	5.44	35.84	6.10
	18	18.16	3.12	21.70	3.66	25.23	4.27	27.00	4.57	28.77	4.89	32.30	5.54	35.84	6.22
	20	18.16	3.15	21.70	3.74	25.23	4.35	27.00	4.67	28.77	4.99	32.30	5.65	35.84	6.35
	21	18.16	3.19	21.70	3.76	25.23	4.38	27.00	4.70	28.77	5.03	32.30	5.71	35.84	6.40
	23	18.16	3.23	21.70	3.84	25.23	4.46	27.00	4.80	28.77	5.12	32.30	5.93	35.84	6.82
	25	18.16	3.29	21.70	3.89	25.23	4.63	27.00	5.03	28.77	5.44	32.30	6.33	35.84	7.27
	27	18.16	3.42	21.70	4.14	25.23	4.93	27.00	5.37	28.77	5.80	32.30	6.74	35.84	7.76
	29	18.16	3.61	21.70	4.38	25.23	5.25	27.00	5.71	28.77	6.18	32.30	7.20	35.84	8.29
	31	18.16	3.84	21.70	4.65	25.23	5.57	27.00	6.06	28.77	6.57	32.30	7.65	35.84	8.82
	33	18.16	4.04	21.70	4.93	25.23	5.91	27.00	6.44	28.77	6.99	32.30	8.14	35.84	9.41
	35	18.16	4.29	21.70	5.23	25.23	6.27	27.00	6.84	28.77	7.42	32.30	8.67	35.84	10.01
	37	18.16	4.53	21.70	5.54	25.23	6.65	27.00	7.25	28.77	7.88	32.30	9.22	35.84	10.66
	39	18.16	4.78	21.70	5.86	25.23	7.05	27.00	7.69	28.77	8.37	32.30	9.79	35.84	11.34
	41	18.16	4.93	21.70	6.11	25.23	7.30	27.00	8.00	28.77	8.68	32.30	10.25	35.84	11.85
	43	18.16	5.09	21.70	6.37	25.23	7.56	27.00	8.24	28.77	8.98	32.30	10.68	35.84	12.36
	45	18.16	5.33	21.70	6.69	25.23	7.87	27.00	8.54	28.77	9.42	32.30	11.16	35.84	13.05
	48	18.16	7.47	21.70	9.29	25.23	10.77	27.00	11.79	28.77	13.22	32.30	15.30	35.84	18.31
50%	-5	15.19	2.27	18.16	2.62	21.05	3.01	22.50	3.16	23.95	3.33	26.84	3.79	29.89	4.08
	-2	15.19	2.29	18.16	2.68	21.05	3.05	22.50	3.20	23.95	3.39	26.84	3.84	29.89	4.14
	0	15.19	2.32	18.16	2.72	21.05	3.10	22.50	3.24	23.95	3.43	26.84	3.90	29.89	4.21
	2	15.19	2.36	18.16	2.75	21.05	3.16	22.50	3.29	23.95	3.49	26.84	3.92	29.89	4.29
	4	15.19	2.38	18.16	2.80	21.05	3.19	22.50	3.33	23.95	3.56	26.84	4.02	29.89	4.40
	6	15.19	2.42	18.16	2.85	21.05	3.24	22.50	3.41	23.95	3.62	26.84	4.08	29.89	4.53
	8	15.19	2.48	18.16	2.90	21.05	3.29	22.50	3.48	23.95	3.67	26.84	4.14	29.89	4.67
	10	15.19	2.53	18.16	2.93	21.05	3.34	22.50	3.54	23.95	3.78	26.84	4.25	29.89	4.74
	12	15.19	2.55	18.16	2.97	21.05	3.40	22.50	3.61	23.95	3.85	26.84	4.33	29.89	4.82
	14	15.19	2.59	18.16	3.00	21.05	3.44	22.50	3.68	23.95	3.91	26.84	4.40	29.89	4.91
	16	15.19	2.63	18.16	3.04	21.05	3.50	22.50	3.74	23.95	3.97	26.84	4.48	29.89	4.99
	18	15.19	2.66	18.16	3.10	21.05	3.55	22.50	3.80	23.95	4.04	26.84	4.55	29.89	5.08
	20	15.19	2.70	18.16	3.14	21.05	3.61	22.50	3.85	23.95	4.12	26.84	4.63	29.89	5.18
	21	15.19	2.72	18.16	3.17	21.05	3.65	22.50	3.89	23.95	4.16	26.84	4.69	29.89	5.23
	23	15.19	2.76	18.16	3.21	21.05	3.70	22.50	3.97	23.95	4.23	26.84	4.76	29.89	5.35
	25	15.19	2.80	18.16	3.27	21.05	3.78	22.50	4.04	23.95	4.36	26.84	5.01	29.89	5.71
	27	15.19	2.85	18.16	3.40	21.05	3.99	22.50	4.31	23.95	4.63	26.84	5.33	29.89	6.08
	29	15.19	3.00	18.16	3.59	21.05	4.23	22.50	4.57	23.95	4.93	26.84	5.67	29.89	6.48
	31	15.19	3.17	18.16	3.80	21.05	4.48	22.50	4.86	23.95	5.23	26.84	6.03	29.89	6.90
	33	15.19	3.36	18.16	4.02	21.05	4.76	22.50	5.14	23.95	5.55	26.84	6.40	29.89	7.33
	35	15.19	3.55	18.16	4.25	21.05	5.03	22.50	5.44	23.95	5.88	26.84	6.80	29.89	7.78
	37	15.19	3.74	18.16	4.50	21.05	5.33	22.50	5.76	23.95	6.23	26.84	7.22	29.89	8.27
	39	15.19	3.95	18.16	4.74	21.05	5.63	22.50	6.10	23.95	6.61	26.84	7.65	29.89	8.79
	41	15.19	4.11	18.16	4.95	21.05	5.83	22.50	6.39	23.95	6.90	26.84	8.06	29.89	9.19
	43	15.19	4.38	18.16	5.29	21.05	6.04	22.50	6.67	23.95	7.08	26.84	8.47	29.89	9.60
	45	15.19	4.48	18.16	5.42	21.05	6.45	22.50	7.19	23.95	7.37	26.84	9.28	29.89	10.42
	48	15.19	4.75	18.16	5.79	21.05	6.67	22.50	7.47	23.95	7.54	26.84	9.76	29.89	10.89

16HP heating mode

Combination (Capacity index)	Outdoor air temp.		Indoor temperature(°C DB)											
			16		18		20		21		22		24	
	°C DB	°C WB	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI	TC	PI
130%	-19.8	-20	32.38	9.04	32.22	9.67	32.07	10.32	32.07	10.63	31.91	10.95	31.91	11.59
	-18.8	-19	32.86	9.24	32.70	9.87	32.70	10.50	32.54	10.81	32.54	11.11	32.38	11.74
	-16.7	-17	34.13	9.67	33.97	10.27	33.81	10.88	33.81	11.18	33.81	11.48	33.65	12.08
	-13.7	-15	35.55	10.12	35.40	10.70	35.24	11.28	35.24	11.56	35.08	11.86	35.08	12.44
	-11.8	-13	36.99	10.56	36.99	11.13	36.83	11.68	36.67	11.96	36.67	12.24	36.51	12.79
	-9.8	-11	38.73	11.03	38.57	11.56	38.41	12.09	38.41	12.36	38.41	12.62	38.25	13.16
	-9.5	-10	39.68	11.26	39.53	11.78	39.37	12.29	39.37	12.56	39.21	12.81	39.21	13.32
	-8.5	-9.1	40.47	11.46	40.32	11.96	40.32	12.47	40.16	12.72	40.16	12.97	40.00	13.49
	-7	-7.6	41.91	11.79	41.91	12.29	41.75	12.77	41.75	13.02	41.59	13.25	41.43	13.75
	-5	-5.6	44.13	12.24	43.97	12.71	43.81	13.17	43.81	13.40	43.65	13.62	43.65	14.09
	-3	-3.7	46.19	12.64	46.03	13.09	46.03	13.52	45.87	13.75	45.87	13.97	45.71	14.40
	0	-0.7	49.84	13.25	49.84	13.67	49.68	14.07	49.68	14.22	49.52	14.48	49.52	14.88
	3	2.2	53.81	13.80	53.65	14.19	53.49	14.57	53.49	14.75	53.49	14.95	53.33	15.32
	5	4.1	56.51	14.15	56.35	14.52	56.35	14.87	56.19	15.05	56.19	15.23	56.03	15.58
	7	6	59.36	14.49	59.21	14.82	59.21	15.17	59.05	15.33	59.05	15.50	56.67	14.88
	9	7.9	62.38	14.78	62.22	15.12	62.22	15.43	62.06	15.60	60.79	15.27	56.67	13.99
120%	11	9.8	65.55	15.08	65.40	15.38	65.08	15.58	62.86	14.97	60.79	14.35	56.67	13.17
	13	11.8	69.04	15.36	68.89	15.66	65.08	14.60	62.86	14.02	60.79	13.47	56.67	12.36
	15	13.7	72.38	15.63	69.20	14.83	65.08	13.75	62.86	13.22	60.79	12.69	56.67	11.66
	-19.8	-20	32.22	9.90	32.06	10.48	31.90	11.08	31.90	11.36	31.90	11.66	31.75	12.26
	-18.8	-19	32.70	10.08	32.54	10.66	32.54	11.25	32.38	11.53	32.38	11.83	32.22	12.41
	-16.7	-17	33.97	10.48	33.81	11.05	33.60	11.59	33.65	11.88	33.65	12.16	33.49	12.71
	-13.7	-15	35.40	10.90	35.24	11.43	35.08	11.96	35.08	12.24	35.08	12.51	34.92	13.04
	-11.8	-13	36.83	11.31	36.83	11.83	36.67	12.34	36.67	12.61	36.51	12.86	36.51	13.37
	-9.8	-11	38.57	11.74	38.41	12.23	38.41	12.72	38.25	12.97	38.25	13.21	38.10	13.70
	-9.5	-10	39.53	11.96	39.37	12.44	39.21	12.91	39.21	13.16	39.21	13.39	39.05	13.87
	-8.5	-9.1	40.32	12.14	40.16	12.61	40.16	13.07	40.00	13.31	40.00	13.55	39.84	14.02
	-7	-7.6	41.75	12.46	41.75	12.91	41.59	13.35	41.59	13.59	41.43	13.80	41.43	14.25
	-5	-5.6	43.97	12.86	43.81	13.29	43.65	13.72	43.65	13.94	43.65	14.15	43.50	14.57
	-3	-3.7	46.04	13.24	46.04	13.65	45.88	14.05	45.88	14.25	45.72	14.47	45.72	14.87
	0	-0.7	49.68	13.80	49.68	14.19	49.53	14.55	49.53	14.75	49.37	14.93	49.37	15.32
	3	2.2	53.65	14.32	53.49	14.67	53.49	15.02	53.33	15.20	53.33	15.36	52.22	15.28
110%	5	4.1	56.35	14.63	56.19	14.97	56.19	15.30	56.03	15.46	56.03	15.63	52.22	14.35
	7	6	59.21	14.93	59.21	15.25	59.05	15.56	58.10	15.35	56.19	14.72	52.22	13.51
	9	7.9	62.23	15.23	62.07	15.53	60.00	15.02	58.10	14.42	56.19	13.84	52.22	12.71
	11	9.8	65.40	15.50	63.81	15.23	60.00	14.12	58.10	13.57	56.19	13.02	52.22	11.98
	13	11.8	67.78	15.35	63.81	14.28	60.00	13.24	58.10	12.74	56.19	12.24	52.22	11.26
	15	13.7	67.78	14.45	63.81	13.46	60.00	12.49	58.10	12.01	56.19	11.54	52.22	10.63
	-19.8	-20	32.06	10.76	31.91	11.29	31.75	11.84	31.75	12.11	31.76	12.38	31.59	12.92
	-18.8	-19	32.54	10.93	32.38	11.46	32.38	11.99	32.38	12.26	32.22	12.52	32.22	13.06
	-16.7	-17	33.81	11.29	33.65	11.81	34.12	12.33	33.49	12.57	33.49	12.84	33.33	13.34
	-13.7	-15	35.24	11.68	35.09	12.18	34.92	12.66	34.92	12.91	34.92	13.16	34.76	13.64
	-11.8	-13	36.67	12.08	36.67	12.54	36.51	13.01	36.51	13.24	36.35	13.47	36.35	13.95
	-9.8	-11	38.41	12.46	38.25	12.91	38.25	13.36	38.09	13.59	38.09	13.80	38.09	14.25
	-9.5	-10	39.37	12.66	39.21	13.09	39.05	13.54	39.05	13.75	39.05	13.97	38.89	14.40
	-8.5	-9.1	40.16	12.82	40.00	13.26	40.00	13.69	39.84	13.90	39.84	14.12	39.84	12.87
	-7	-7.6	41.59	13.12	41.59	13.52	41.43	13.94	41.43	14.15	41.43	14.35	41.27	14.77
	-5	-5.6	43.81	13.49	43.65	13.89	43.49	14.27	43.49	14.47	43.49	14.67	43.33	15.07
	-3	-3.7	45.88	13.84	45.88	14.20	45.72	14.58	45.72	14.77	45.56	14.95	45.56	15.33
	0	-0.7	49.52	14.35	49.52	14.70	49.37	15.05	49.37	15.22	49.37	15.40	47.94	15.10
	3	2.2	53.49	14.83	53.33	15.15	53.33	15.46	53.17	15.61	51.43	14.98	47.94	13.74
	5	4.1	56.19	15.12	56.19	15.43	55.08	15.28	53.17	14.67	51.43	14.09	47.94	12.92
	7	6	59.05	15.40	58.57	15.50	55.08	14.35	53.17	13.79	51.43	13.24	47.94	12.16
	9	7.9	62.06	15.65	58.57	14.57	55.08	13.50	53.17	12.97	51.43	12.46	47.94	11.46
	11	9.8	62.06	14.72	58.57	13.70	55.08	12.71	53.17	12.23	51.43	11.74	47.94	10.81
	13	11.8	62.06	13.80	58.57	12.86	55.08	11.94	53.17	11.49	51.43	11.05	47.94	10.18
	15	13.7	62.06	12.26	58.57	12.13	55.08	11.28	53.17	10.85	51.43	10.45	47.94	9.63

100%	-19.8	-20	31.91	11.63	31.75	12.11	31.75	12.61	31.59	12.86	31.59	13.09	31.43	13.59
	-18.8	-19	32.38	11.78	32.38	12.26	32.22	12.74	32.22	12.99	32.07	13.24	32.07	13.72
	-16.7	-17	33.65	12.11	33.49	12.57	33.49	13.04	33.34	13.27	33.34	13.50	33.34	13.97
	-13.7	-15	35.08	12.46	34.92	12.91	34.76	13.36	34.76	13.59	34.76	13.80	34.61	14.25
	-11.8	-13	36.51	12.82	36.51	13.24	36.35	13.67	36.35	13.89	36.35	14.10	36.19	14.53
	-9.8	-11	38.26	13.17	38.10	13.59	38.10	13.99	38.10	14.20	37.94	14.40	37.94	14.80
	-9.5	-10	39.21	13.36	39.05	13.75	39.05	14.15	38.89	14.35	38.89	14.55	38.73	14.95
	-8.5	-9.1	40.00	13.50	39.84	13.90	39.84	14.29	39.84	14.48	39.69	14.68	39.69	15.07
	-7	-7.6	41.43	13.77	41.43	14.15	41.27	14.52	41.27	14.72	41.27	14.90	41.11	15.28
	-5	-5.6	43.65	14.12	43.49	14.47	43.49	14.83	43.34	15.00	43.34	15.18	43.18	15.55
	-3	-3.7	45.72	14.43	45.72	13.11	45.56	15.12	45.56	15.28	45.56	15.45	43.65	14.80
	0	-0.7	49.37	14.90	49.37	15.21	49.21	15.53	48.42	15.28	46.83	14.65	43.65	13.44
	3	2.2	53.34	15.33	53.18	15.61	50.00	14.45	48.42	13.89	46.83	13.34	43.65	12.24
	5	4.1	56.03	15.61	53.18	14.67	50.00	13.59	48.42	13.07	46.83	12.56	43.65	11.54
	7	6	56.35	14.82	53.18	13.79	50.00	12.79	48.42	12.31	46.83	11.83	43.65	10.88
	9	7.9	56.35	13.92	53.18	12.97	50.00	12.04	48.42	11.44	46.83	11.15	43.65	10.27
	11	9.8	56.35	13.11	53.18	12.22	50.00	11.36	48.42	10.93	46.83	10.51	43.65	9.70
	13	11.8	56.35	12.31	53.18	11.49	50.00	10.70	48.42	10.30	46.83	9.92	43.65	9.15
	15	13.7	56.35	11.61	53.18	10.85	50.00	10.10	48.42	9.73	46.83	9.37	43.65	8.67
90%	-19.8	-20	31.69	12.49	31.53	12.92	31.53	13.37	31.37	13.59	31.37	13.82	31.37	14.25
	-18.8	-19	32.17	12.62	32.17	13.07	32.01	13.50	32.01	13.72	32.01	13.94	31.85	14.37
	-16.7	-17	33.44	12.94	33.27	13.36	33.27	13.77	33.27	13.99	33.12	14.19	33.12	14.60
	-13.7	-15	34.86	13.25	34.70	13.65	34.70	14.05	34.54	14.25	34.54	14.45	34.54	14.85
	-11.8	-13	36.28	13.57	36.28	13.95	36.13	14.33	36.13	14.53	36.13	14.72	35.97	15.10
	-9.8	-11	38.03	13.89	38.03	14.25	37.87	14.62	37.87	14.80	37.87	15.00	37.71	15.36
	-9.5	-10	38.98	14.05	38.82	14.42	38.82	14.77	38.66	14.95	38.66	15.13	38.66	15.48
	-8.5	-9.1	39.77	14.20	39.77	14.55	39.61	14.90	39.61	15.07	39.61	15.25	39.14	15.40
	-7	-7.6	41.20	14.43	41.20	14.77	41.04	15.11	41.04	15.28	41.04	15.45	39.14	14.70
	-5	-5.6	43.42	14.75	43.26	15.07	43.26	15.38	43.10	15.55	41.99	15.07	39.14	13.82
	-3	-3.7	45.48	15.03	45.48	15.33	45.00	15.40	43.42	14.78	41.99	14.19	39.14	13.02
	0	-0.7	49.28	15.46	47.85	15.08	45.00	13.97	43.42	13.42	41.99	12.89	39.14	11.84
	3	2.2	50.71	14.73	47.85	13.72	45.00	12.72	43.42	12.24	41.99	11.76	39.14	10.83
	5	4.1	50.71	13.85	47.85	12.91	45.00	11.99	43.42	11.53	41.99	11.10	39.14	10.22
	7	6	50.71	13.02	47.85	12.16	45.00	11.29	43.42	10.88	41.99	10.46	39.14	9.65
	9	7.9	50.71	12.28	47.85	11.44	45.00	10.65	43.42	10.26	41.99	9.88	39.14	9.12
	11	9.8	50.71	11.56	47.85	10.80	45.00	10.07	43.42	9.70	41.99	9.34	39.14	8.64
	13	11.8	50.71	10.88	47.85	10.18	45.00	9.48	43.42	9.15	41.99	8.82	39.14	8.16
	15	13.7	50.71	10.28	47.85	9.62	45.00	8.99	43.42	8.67	41.99	8.35	39.14	7.74
80%	-19.8	-20	31.59	13.35	31.43	13.74	31.43	14.14	31.43	14.33	31.27	14.53	31.27	14.92
	-18.8	-19	32.06	13.47	32.06	13.87	31.90	14.25	31.90	14.45	31.90	14.63	31.75	15.03
	-16.7	-17	33.33	13.75	33.18	14.12	33.18	14.50	33.18	14.68	33.18	14.87	33.02	15.23
	-13.7	-15	34.76	14.04	34.60	14.38	34.60	14.75	34.60	14.92	34.44	15.10	34.44	15.46
	-11.8	-13	36.19	14.32	36.19	14.67	36.03	15.00	36.03	15.16	36.03	15.35	34.92	14.93
	-9.8	-11	37.94	14.60	37.94	14.93	37.78	15.26	37.78	15.41	37.46	15.38	34.92	14.10
	-9.5	-10	38.89	14.75	38.72	15.06	38.73	15.38	38.73	15.55	37.46	14.93	34.92	13.69
	-8.5	-9.1	39.68	14.88	36.88	15.20	39.52	15.50	38.73	15.15	37.46	14.53	34.92	13.32
	-7	-7.6	41.11	15.10	41.11	15.40	40.00	15.06	38.73	14.47	37.46	13.89	34.92	12.74
	-5	-5.6	43.33	15.36	42.54	15.28	40.00	14.15	38.73	13.60	37.46	13.05	34.92	11.99
	-3	-3.7	45.08	15.45	42.54	14.38	40.00	13.32	38.73	12.82	37.46	12.31	34.92	11.33
	0	-0.7	45.08	14.02	42.54	13.05	40.00	12.13	38.73	11.68	37.46	11.21	34.92	10.33
	3	2.2	45.08	12.77	42.54	11.91	40.00	11.08	38.73	10.66	37.46	10.26	34.92	9.47
	5	4.1	45.08	12.03	42.54	11.23	40.00	10.45	38.73	10.07	37.46	9.70	34.92	8.95
	7	6	45.08	11.33	42.54	10.60	40.00	9.87	38.73	9.52	37.46	9.17	34.92	8.47
	9	7.9	45.08	10.70	42.54	10.00	40.00	9.32	38.73	8.99	37.46	8.67	34.92	8.02
	11	9.8	45.08	10.10	42.54	9.45	40.00	8.82	38.73	8.50	37.46	8.20	34.92	7.61
	13	11.8	45.08	9.52	42.54	8.92	40.00	8.34	38.73	8.04	37.46	7.76	34.92	7.19
	15	13.7	45.08	9.00	42.54	8.45	40.00	7.91	38.73	7.62	37.46	7.36	34.92	6.84
70%	-19.8	-20	31.36	14.22	31.20	14.55	31.20	14.90	31.20	15.06	31.20	15.25	30.41	15.08
	-18.8	-19	31.83	14.33	31.83	14.67	31.68	15.00	31.68	15.16	31.68	15.35	30.41	14.77
	-16.7	-17	33.10	14.57	33.10	14.90	32.94	15.21	32.94	15.38	32.62	13.70	30.41	14.09
	-13.7	-15	34.52	14.82	34.37	15.13	34.37	15.45	33.73	15.21	32.62	14.60	30.41	13.39
	-11.8	-13	35.95	15.06	35.95	15.36	35.00	15.00	33.73	14.42	32.62	13.84	30.41	12.69
	-9.8	-11	37.69	15.31	37.22	15.30	35.00	14.17	33.73	13.62	32.62	13.07	30.41	12.01
	-9.5	-10	38.64	15.45	37.22	14.85	35.00	13.75	33.73	13.22	32.62	12.71	30.41	11.68

	-8.5	-9.1	39.43	15.53	37.22	14.45	35.00	13.39	33.73	12.87	32.62	12.37	30.41	11.38
	-7	-7.6	39.43	14.83	37.22	13.80	35.00	12.81	33.73	12.32	32.62	11.84	30.41	10.90
	-5	-5.6	39.43	13.94	37.22	12.99	35.00	12.06	33.73	11.59	32.62	13.70	30.41	10.28
	-3	-3.7	39.43	13.12	37.22	12.24	35.00	11.38	33.73	10.95	32.62	10.53	30.41	9.72
	0	-0.7	39.43	11.94	37.22	11.16	35.00	10.38	33.73	10.00	32.62	9.63	30.41	8.90
	3	2.2	39.43	10.91	37.22	10.22	35.00	9.52	33.73	9.17	32.62	8.84	30.41	8.17
	5	4.1	39.43	10.30	37.22	9.63	35.00	9.00	33.73	8.67	32.62	8.35	30.41	7.74
	7	6	39.43	9.73	37.22	9.12	35.00	8.50	33.73	8.20	32.62	7.92	30.41	7.34
	9	7.9	39.43	9.20	37.22	8.62	35.00	8.06	33.73	7.77	32.62	7.51	30.41	6.96
	11	9.8	39.43	8.70	37.22	8.16	35.00	7.64	33.73	7.37	32.62	7.13	30.41	6.61
	13	11.8	39.43	8.22	37.22	7.72	35.00	7.23	33.73	6.99	32.62	6.74	30.41	6.28
	15	13.7	39.43	7.79	37.22	7.32	35.00	6.86	33.73	6.64	32.62	6.41	30.41	5.98
60%	-19.8	-20	31.27	15.08	31.11	15.36	30.00	14.78	29.05	14.20	28.10	13.64	26.19	12.51
	-18.8	-19	31.75	15.18	31.75	15.46	30.00	14.47	29.05	13.90	28.10	13.34	26.19	12.24
	-16.7	-17	33.02	15.38	31.91	14.90	30.00	13.80	29.05	13.27	28.10	12.74	26.19	11.71
	-13.7	-15	33.81	15.21	31.91	14.15	30.00	13.12	29.05	12.62	28.10	12.12	26.19	11.14
	-11.8	-13	33.81	14.40	31.91	13.40	30.00	12.44	29.05	11.98	28.10	11.51	26.19	10.65
	-9.8	-11	33.81	13.60	31.91	12.67	30.00	11.78	29.05	11.33	28.10	10.90	26.19	10.05
	-9.5	-10	33.81	13.22	31.91	12.32	30.00	11.44	29.05	11.03	28.10	10.60	26.19	9.77
	-8.5	-9.1	33.81	12.87	31.91	12.01	30.00	11.16	29.05	10.75	28.10	10.33	26.19	9.53
	-7	-7.6	33.81	12.31	31.91	11.49	30.00	10.68	29.05	10.30	28.10	9.90	26.19	9.15
	-5	-5.6	33.81	11.59	31.91	10.83	30.00	10.08	29.05	9.72	28.10	9.35	26.19	8.65
	-3	-3.7	33.81	10.95	31.91	10.23	30.00	9.53	29.05	9.20	28.10	8.85	26.19	8.19
	0	-0.7	33.81	10.00	31.91	9.37	30.00	8.74	29.05	8.44	28.10	8.12	26.19	7.52
	3	2.2	33.81	9.17	31.91	8.60	30.00	8.04	29.05	7.76	28.10	7.49	26.19	6.94
	5	4.1	33.81	8.67	31.91	8.14	30.00	7.61	29.05	7.36	28.10	7.09	26.19	6.59
	7	6	33.81	8.20	31.91	7.71	30.00	7.21	29.05	6.98	28.10	6.74	26.19	6.26
	9	7.9	33.81	7.77	31.91	7.31	30.00	6.84	29.05	6.63	28.10	6.39	26.19	5.96
	11	9.8	33.81	7.37	31.91	6.94	30.00	6.51	29.05	6.30	28.10	6.08	26.19	5.68
	13	11.8	33.81	6.98	31.91	6.58	30.00	6.18	29.05	5.98	28.10	5.78	26.19	5.40
	15	13.7	33.81	6.64	31.91	6.25	30.00	5.88	29.05	5.70	28.10	5.51	26.19	5.15
50%	-19.8	-20	28.17	13.72	26.58	12.77	25.00	11.86	24.05	11.43	23.26	10.98	21.68	10.12
	-18.8	-19	28.17	13.42	26.58	12.51	25.00	11.63	24.05	11.18	23.26	10.75	21.68	9.92
	-16.7	-17	28.17	12.81	26.58	11.94	25.00	11.11	24.05	10.70	23.26	10.30	21.68	9.50
	-13.7	-15	28.17	12.19	26.58	11.38	25.00	10.58	24.05	10.20	23.26	9.82	21.68	9.07
	-11.8	-13	28.17	11.58	26.58	10.81	25.00	10.07	24.05	9.70	23.26	9.33	21.68	8.64
	-9.8	-11	28.17	10.96	26.58	10.25	25.00	9.55	24.05	9.20	23.26	8.87	21.68	8.20
	-9.5	-10	28.17	10.66	26.58	9.97	25.00	9.30	24.05	8.97	23.26	8.64	21.68	7.99
	-8.5	-9.1	28.17	10.40	26.58	9.73	25.00	9.07	24.05	8.75	23.26	8.44	21.68	7.81
	-7	-7.6	28.17	9.97	26.58	9.33	25.00	8.70	24.05	8.40	23.26	8.11	21.68	7.51
	-5	-5.6	28.17	9.40	26.58	8.82	25.00	8.24	24.05	7.96	23.26	7.67	21.68	7.11
	-3	-3.7	28.17	8.90	26.58	8.35	25.00	7.81	24.05	7.54	23.26	7.27	21.68	6.76
	0	-0.7	28.17	8.17	26.58	7.67	25.00	7.19	24.05	6.94	23.26	6.71	21.68	6.25
	3	2.2	28.17	7.52	26.58	7.08	25.00	6.63	24.05	6.41	23.26	6.20	21.68	5.78
	5	4.1	28.17	7.14	26.58	6.71	25.00	6.30	24.05	6.10	23.26	5.90	21.68	5.50
	7	6	28.17	6.78	26.58	6.38	25.00	6.00	24.05	5.80	23.26	5.61	21.68	5.25
	9	7.9	28.17	6.43	26.58	6.06	25.00	5.70	24.05	5.53	23.26	5.35	21.68	5.00
	11	9.8	28.17	6.11	26.58	5.76	25.00	5.43	24.05	5.27	23.26	5.10	21.68	4.77
	13	11.8	28.17	5.81	26.58	5.48	25.00	5.17	24.05	5.02	23.26	4.85	21.68	4.55
	15	13.7	28.17	5.53	26.58	5.23	25.00	4.93	24.05	4.78	23.26	4.63	21.68	4.35

Note:

1,  is shown as reference

2, In cooling mode, avoid the outdoor air temperature range from 42-48 degree C, when selecting the models.

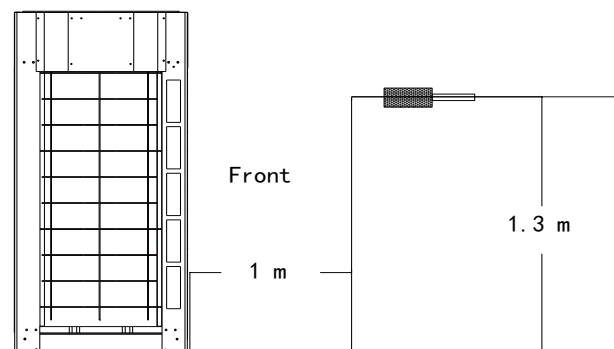
In heating mode, avoid the outdoor air temperature range from -15 to -20 degree C, when selecting the models.

3, The above table shows the average value of conditions may operate

4, It is recommended to connect less than 130%

8. Sound Levels

Standard of testing

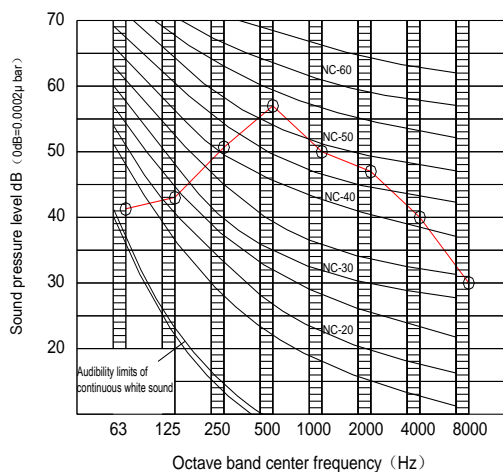


Test value

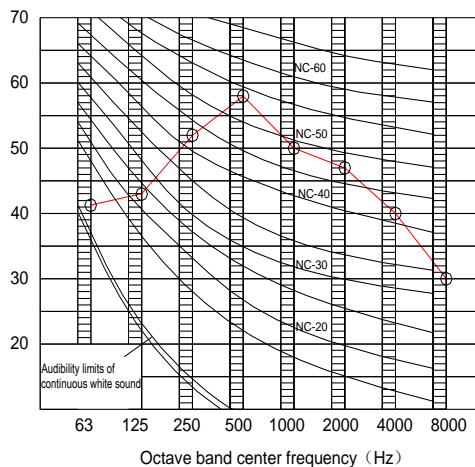
Outdoor unit (HP)	Noise level (dB)
8	57
10	57
12	58
14	60
16	60

Sound Curve:

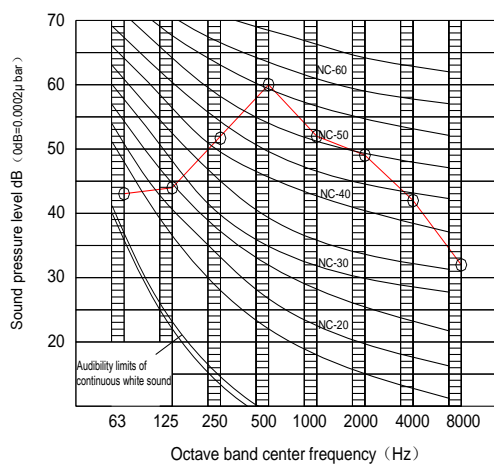
8,10 HP



12 HP

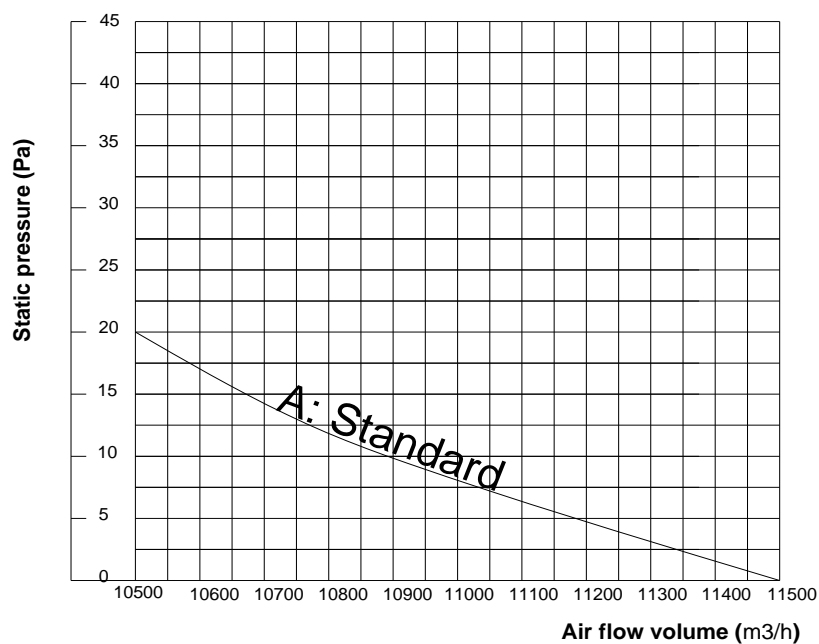


14,16 HP

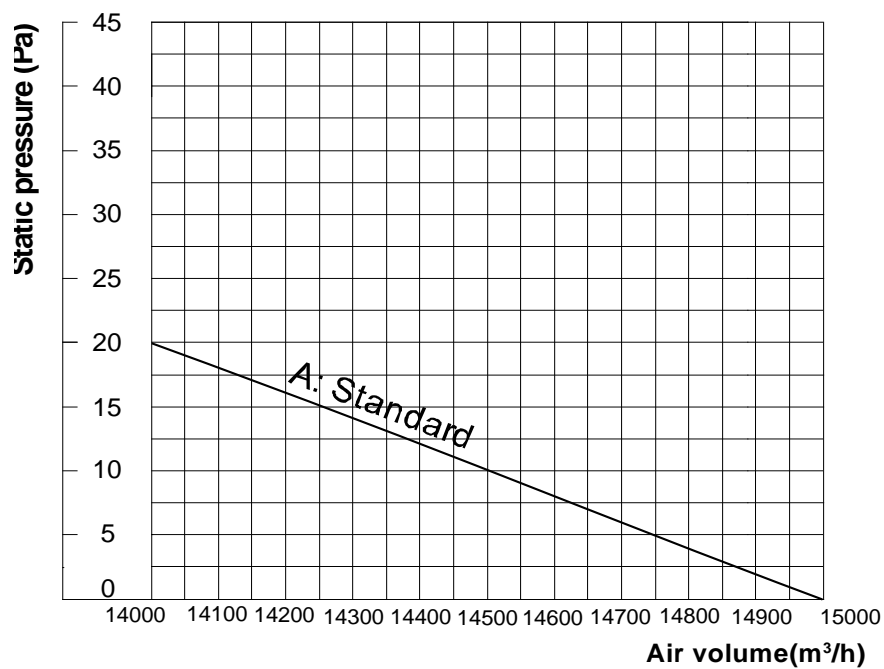


9. Outdoor Fan performance

9.1. 8,10HP Curve diagram of static pressure, air flow volume:



9.2 12,14,16HP Curve diagram of static pressure, air flow volume:



10. Accessories

10.1 Standard accessories

No	Name	Quantity	Purpose
1	Installation manual of outdoor unit	1	/
2	Operation manual of outdoor unit	1+1	(Be sure to deliver it to the customer)
3	Operation manual of indoor unit	1+1	(Be sure to deliver it to the customer)
4	Screw bag	1	Spare
5	Straight screwdriver	1	Dialing
6	Gauge joint	1	For airtight test
7	90° elbow	2	Pipe connecting

10.2. Optional accessories

Optional accessories	Model name	Packing Size (mm)	Gross Weight (kg)	Function
Branch Joint of outdoor side	FQZHW-02N1C	455*55*185	1.4	Distribute the refrigerant to Indoor Units and balance the resistance between each outdoor unit.
	FQZHW-03N1C	465*85*265	2.7	
	FQZHW-04N1C	465*115*255	4	
Branch Joint of indoor side	FQZHN-01C	255*50*90	0.48	
	FQZHN-02C	280*50*95	0.6	
	FQZHN-03C	310*70*125	0.87	
	FQZHN-04C	350*70*170	1.3	
	FQZHN-05C	365*110*205	1.6	

Optional accessories	Model name	Function
Outdoor controller	MD-CCM02/E	Monitor the outdoor operating parameter
Three phase electricity power protector	HYJ-IV 202301600300	To stop the air-conditioner running in case of bad power supply such as Phase Error, Over-voltage, Under-voltage lose, phase lost and phase sequence inverse. Thus to protect the equipment.
Digital ammeter (WHM)	DTS634/DT636	Electricity Charge monitor

11. Functional parts and safety devices

Item	Symbol	Name	MDV-252(8)W/DRN1(C)	MDV-280(10)W/DRN1(C)	MDV-335(12)W/DRN1(C)	
Compressor	Inverter	Inverter compressor	E655DHD-65D2YG	E655DHD-65D2YG	E405DHD-36D2Y	
	FIX1	Fixed speed compressor	、	、	E655DH-65D2YG	
	Compressor	Open temperature	160±5℃			
	Safety OLP	Starting current	--	--	--/68A	
	CCH	Crank case heater	DJRD-520A-1500-27.6W *2			
Motor and Security Devices	Motor	Fan motor	Model	WZDK750-38G-4	WZDK750-38G-4	WZDK560-38G(A)/YD K380-4D-1
			Output power	750W	750W	560+380
		Safety thermostat	On	115℃		
			Off	/		
	HP	High pressure switch	OFF: 44 (±1) kg/cm ² /ON: 32 (±1) kg/cm ²			
	LP	Low pressure switch	OFF: 0.3 (±1) kg/cm ² /ON: 1.0 (±1) kg/cm ²			
	Temperature sensor	T3,T4	Temperature sensor	25℃=10KΩ		
Discharge thermostat		(condenser outlet/ambient thermostat (Inverter /Fixed discharge))	BW130℃ ON:130℃ OFF:85℃			
Pressure sensor	HPSH	High pressure sensor (discharge)	Model: YLCGQ-45CP2-7K6J10,Character: Vout=1.1603*P+0.5(MPa)			
Functional Parts	PMV	Electronic expansion valve	VPF-32D40 Foshan Hualu			
	4-W/V	4-way valve	STF-01VN1 Foshan Hualu			
	SV	Solenioied valve	FDF2A-217-PK, FDF6A-049-PK etc. Zhejiang Dunan			

Item	Symbol	Name	MDV-400(14)W/DRN1(C)	MDV-450(16)W/DRN1(C)
Compressor	Inverter	Inverter compressor	E655DHD-65D2YG	E655DHD-65D2YG
	FIX1	Fixed speed compressor	E605DH-59D2YG	E655DH-65D2YG(GC)
	FIX2	Fixed speed compressor	/	/
	Compressor	Open temperature	160±5℃	
	Safety OLP	Starting current	--/62A	--/68A
	CCH	Crank case heater	27.6W *2	
Motor and Security Devices	Motor	Fan motor	Model	WZDK560-38G(A)/YDK380-4D-1
			Output power	560+380
		Safety thermostat	On	115℃
			Off	/
	HP	High pressure switch	OFF: 44 (±1) kg/cm ² /ON: 32 (±1) kg/cm ²	
	LP	Low pressure switch	OFF: 0.3 (±1) kg/cm ² /ON: 1.0 (±1) kg/cm ²	
Temperature sensor	T3,T4	Temperature sensor	25℃=10KΩ	
	Discharge thermostat	(condenser outlet/ambient thermostat (Inverter/Fixed discharge))	BW130℃ ON:130℃ OFF:85℃	
Pressure sensor	HPSH	High pressure sensor (discharge)	Model: YLCGQ-45CP2-7K6J10,Character: Vout=1.1603*P+0.5(MPa)	
Functional Parts	PMV	Electronic expansion valve	VPF-32D40 (2 sets) Foshan Hualu	
	4-W/V	4-way valve	STF-01VN1 Foshan Hualu	
	SV	Solenoid valve	FDF2A-217-PK, FDF6A-049-PK etc Zhejiang Dunan	

Part 4 Installation

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1. Installation Introduction

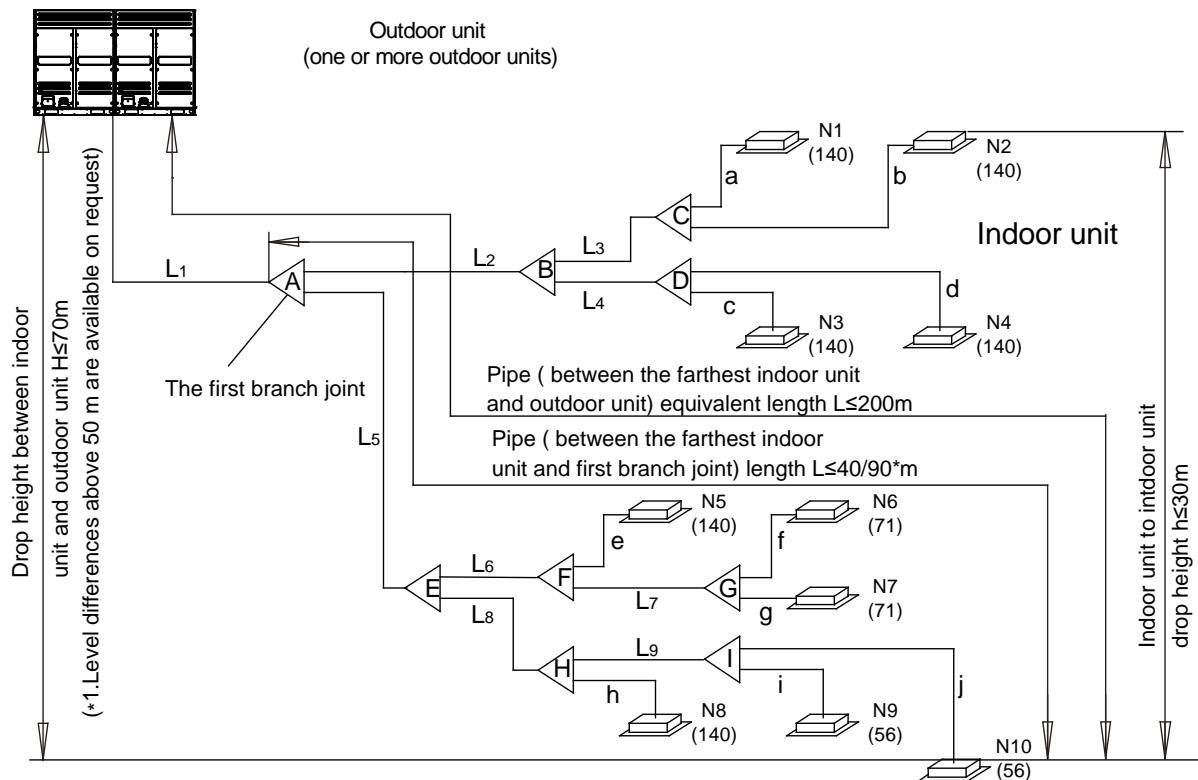
1.1 Select the Refrigerant Piping for V4+ K series modular type

1.1.1 Length and drop height permitted of the refrigerant piping

Table 4-1

			permitted length	Pipe
Pipe length	Total pipe length(actual length)		$\leq 1000\text{m}$	$L_1+L_2+L_3\dots+L_8+L_9+a+b+c+\dots+i+j$
	Farthest pipe length	Actual length	$\leq 175\text{m}$	$L_1+L_5+L_8+L_9+j$
		Equivalent length	$\leq 200\text{m}$	
	Equivalent length L of pipe from the first branch to the farthest one		$\leq 40\text{m}/90\text{m}$	$L_5+L_8+L_9+j$
Drop height	Drop height between indoor unit and outdoor unit	Outdoor unit up	$\leq 70\text{m}^*$	—
		Outdoor unit down	$\leq 110\text{m}$	
	Drop height between indoor unit and indoor unit		$\leq 30\text{m}$	

Fig 4-1



Note:

*1.The allowable length from the first branch joint to the farthest indoor unit should be equal to or

shorter than 40m. But the allowable length can extended to 90m, if the selection principle can meets all the following conditions.

Condition	Example
1.It is needed to increase all the pipe diameters of the the main distribution pipe which between the first and the last branch joint assembly. (Please change the pipe diameter at field) If the pipe diameter of the main slave pipe is the same as the main pipe, then it is not needed to be increased.	<div style="border: 1px solid black; display: inline-block; padding: 2px;">N10</div> $L5+L8+L9+j \leq 90m$ L2,L3,L4,L5,L6,L7,L8,L9 Need to increase the pipe diameter of the distribution pipe Increasing size as the following: $\phi 9.5 \rightarrow \phi 12.7$ $\phi 12.7 \rightarrow \phi 15.9$ $\phi 15.9 \rightarrow \phi 19.1$ $\phi 19.1 \rightarrow \phi 22.2$ $\phi 22.2 \rightarrow \phi 25.4$ $\phi 25.4 \rightarrow \phi 28.6$ $\phi 28.6 \rightarrow \phi 31.8$ $\phi 31.8 \rightarrow \phi 38.1$ $\phi 38.1 \rightarrow \phi 41.3$ $\phi 41.3 \rightarrow \phi 44.5$ $\phi 44.5 \rightarrow \phi 54.0$
2. When counting the total extended length, the actual length of above distribution pipes must be doubled.(Expect the main pipe and the distribution pipes which no need to be increased.) $L1+(L2+L3+L4+L5+L6+L7+L8+L9) \times 2+a+b+c+d+e+f+g+h+i+j \leq 1000m$	Reference Figure.4-1
3. The length from the indoor unit to the nearest branch joint assembly $\leq 40m$ $a,b,c,...j \leq 40m$ (Pipe diameter requirements, please refers to table .4-3)	Reference Figure.4-1
4. The distance difference between [the outdoor unit to the farthest indoor unit] and [the outdoor unit to the nearest indoor unit] is $\leq 40m$. The farthest indoor unit <div style="border: 1px solid black; display: inline-block; padding: 2px;">N10</div> The nearest indoor unit <div style="border: 1px solid black; display: inline-block; padding: 2px;">N1</div> $(L1+L5+L8+L9+j)-(L1+L2+L3+a) \leq 40m$	Reference Figure.4-1

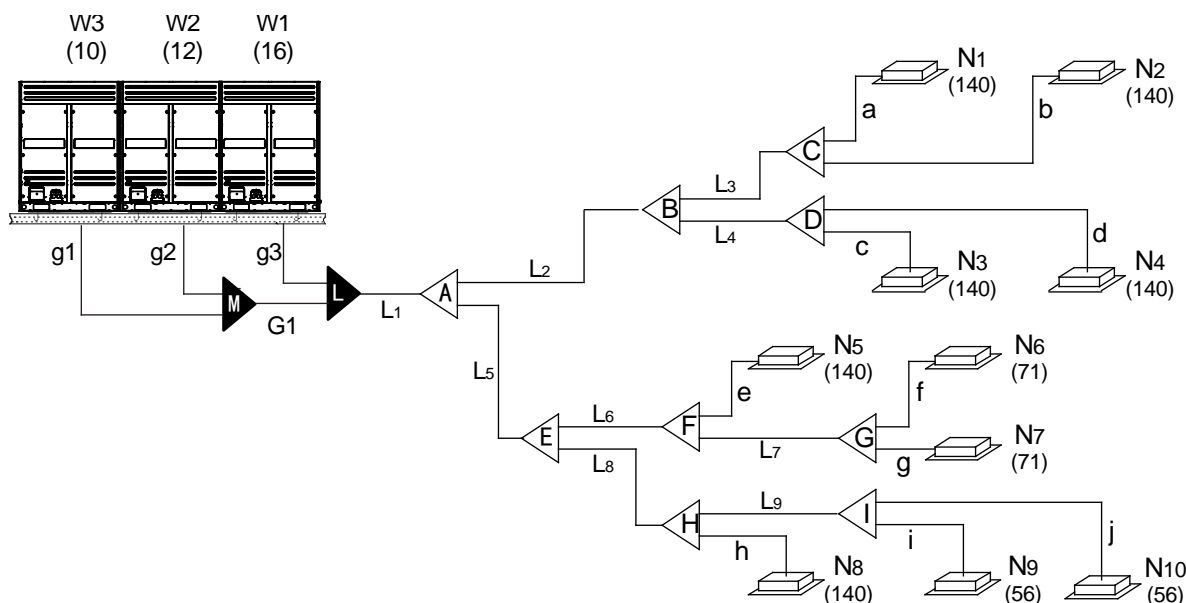
*2.Level difference above 50m are not supported by default but the project need to be approved by the manufacture. (if the outdoor unit is above the indoor unit.)

3. Each branch equals to 0.5m pipe length. All branches must be purchased from Midea, otherwise system is induced to malfunction.

4. All branches must be purchased from Midea, otherwise system is induced to malfunction.

1.1.2 Select the refrigerant piping

Fig 4-2



Note: In the above drawing, the capacity unit of indoor side is (x100W), and the outdoor side is HP.

Table 4-2

The Pipe Type	The Detailed Pipe Place	Code
Outdoor unit pipe	The pipe between outdoor unit and outdoor branch, pipe between outdoor branches	g1, g2, g3, G1
Outdoor branch	The outdoor branch assy.	L, M
The main pipe	The pipe between outdoor and the No.1 indoor branch	L1
Indoor main pipe	The pipe between indoor branches	L2~L9
Indoor branch	The indoor branch assy.	A ~ I
Indoor unit pipe	The pipe connecting directly to indoor unit	a ~ j

1.1.2.1 Selection of the indoor unit pipes

E.g. The pipe (a ~ j) in the above drawing.

Please refer to the following table.

Table 4-3

The total capacity of Indoor units(x100W)	When indoor unit pipe length≤10m		When indoor unit pipe length>10m	
	Gas side	Liquid side	Gas side	Liquid side
A≤45	Φ12.7mm	Φ6.4mm	Φ15.9mm	Φ9.5mm
A≥56	Φ15.9mm	Φ9.5mm	Φ19.1mm	Φ12.7mm

1.1.2.2 Selection of the branches and indoor main pipe

E.g. The branches (A ~I) and indoor main pipe (L2~L9) in the above drawing.

Please refer to the following table.

Table 4-4

The capacity of downward indoor units(x100W)	The indoor main pipe dimension (mm)		The branches
	Gas pipe	Liquid pipe	
A<166	Φ15.9	Φ9.5	FQZHN-01C
166≤A<230	Φ19.1	Φ9.5	FQZHN-01C
230≤A<330	Φ22.2	Φ9.5	FQZHN-02C

330≤A<460	Φ28.6	Φ12.7	FQZHN-03C
460≤A<660	Φ28.6	Φ15.9	FQZHN-03C
660≤A<920	Φ31.8	Φ19.1	FQZHN-03C
920≤A<1350	Φ38.1	Φ19.1	FQZHN-04C
1350≤A<1800	Φ41.3	Φ22.2	FQZHN-05C
1800≤A	Φ44.5	Φ25.4	FQZHN-05C

1.1.2.3 Selection of the main pipe (L1)

E.g. The main pipe (L1) in the above drawing

Please refer to the following table:

Table 4-5

The capacity of outdoor units	When total equivalent length<90m			When total equivalent length≥90m		
	Gas side (mm)	Liquid side (mm)	The indoor No.1 distributor	Gas side (mm)	Liquid side (mm)	The indoor No.1 branch
8HP	Φ22.2	Φ9.53	FQZHN-02C	Φ22.2	Φ12.7	FQZHN-02C
10HP	Φ22.2	Φ9.53	FQZHN-02C	Φ25.4	Φ12.7	FQZHN-02C
12~14HP	Φ25.4	Φ12.7	FQZHN-03C	Φ28.6	Φ15.9	FQZHN-03C
16HP	Φ28.6	Φ12.7	FQZHN-03C	Φ31.8	Φ15.9	FQZHN-03C
18~22HP	Φ28.6	Φ15.9	FQZHN-03C	Φ31.8	Φ19.1	FQZHN-03C
24HP	Φ28.6	Φ15.9	FQZHN-03C	Φ31.8	Φ19.1	FQZHN-03C
26~32HP	Φ31.8	Φ19.1	FQZHN-03C	Φ38.1	Φ22.2	FQZHN-04C
34~48HP	Φ38.1	Φ19.1	FQZHN-04C	Φ38.1	Φ22.2	FQZHN-04C
50~64HP	Φ41.3	Φ22.2	FQZHN-05C	Φ44.5	Φ25.4	FQZHN-05C

Notice: If the total indoor units' capacity is more than the total outdoor units', please select the main pipe dia. according to the bigger one.

E.g. when the total capacity of 16HP+16HP+14HP paralleled outdoor units is 46HP, if the total pipe length is more than 90m, the pipe dia. is Φ41.3 and Φ22.2 according to the above table. While the total indoor units' capacity is 136kW, the pipe dia. is Φ44.5 and Φ22.2 according to the No.1.1.2.2 table. Then, according to the principle of selecting the bigger, the main pipe dia. should be Φ44.5 and Φ22.2.

1.1.2.4 Selection of the branch (L, M) and the outdoor unit pipe (g1, g2, g3, G1)

E.g. The branch (L, M) and outdoor unit pipe (g1, g2, g3, G1) in the above drawing.

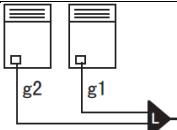
When there is only single outdoor unit, please refer to the following table:

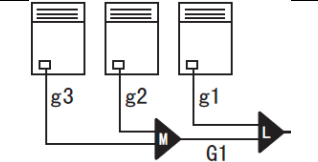
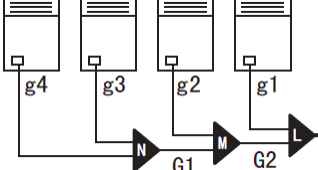
Table 4-6

Model	The outdoor unit pipe dia. (mm)	
8HP	Φ25.4	Φ12.7
10HP	Φ25.4	Φ12.7
12HP	Φ31.8	Φ15.9
14HP	Φ31.8	Φ15.9
16HP	Φ31.8	Φ15.9

When the multi outdoor units are paralleled, please refer to the following table:

Table 4-7

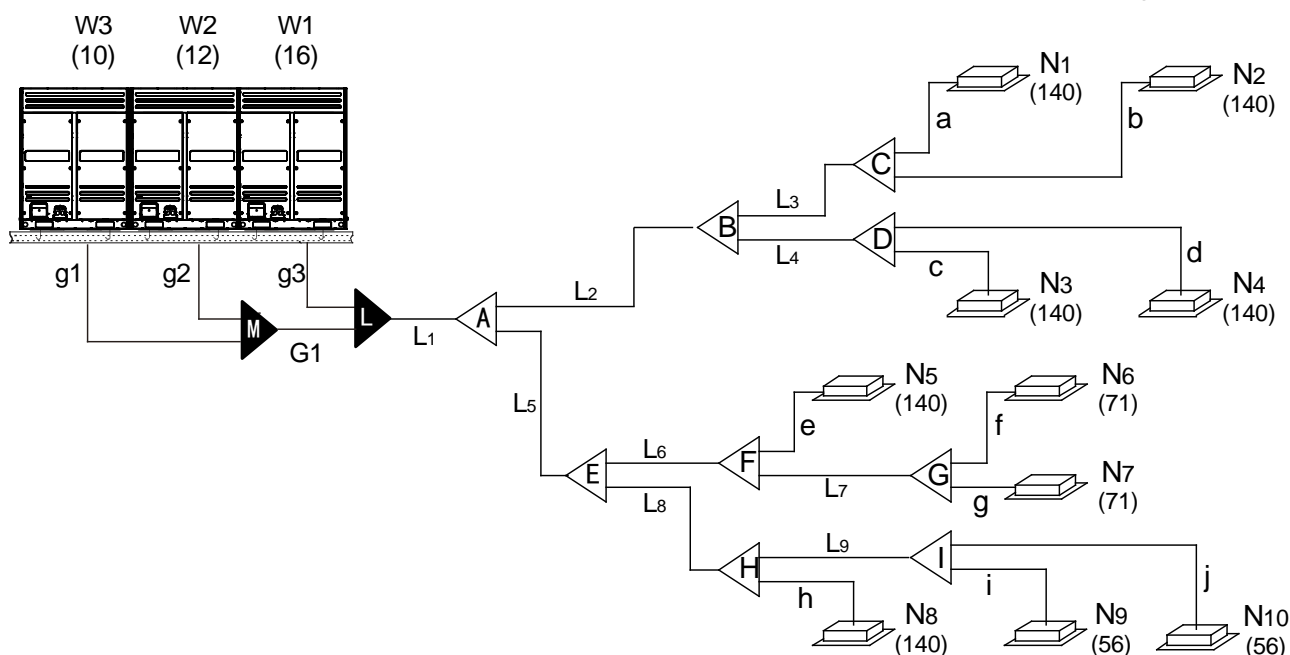
Outdoor unit quantity	Drawing example	Outdoor unit pipe dia.(mm)	Outdoor branch
2		g1、g2: 8、10HP: Φ25.4/12.7; 12~16HP: Φ31.8/Φ15.9	L: FQZHW-02N1C

3		g1、g2、g3: 8、10HP: $\Phi 25.4\Phi/12.7$; 12~16HP: $\Phi 31.8\Phi/15.9$; G1: $\Phi 38.1/\Phi 19.1$	L+M: FQZHW-03N1C
4		g1、g2、g3、g4: 8、10HP: $\Phi 25.4\Phi/12.7$; 12~16HP: $\Phi 31.8\Phi/15.9$; G1: $\Phi 38.1/\Phi 19.1$; G2: $\Phi 41.3/\Phi 22.2$	L+M+N: FQZHW-04N1C

Notice: All branches must be purchased from Midea.

1.1.3 Pipe selection example

Fig 4-3



Notice: Suppose total equivalent pipe length beyond 90m.

1.1.3.1 Select each indoor unit pipe(a~j) according to the table 4-3:

Indoor unit pipe	capacity of indoor units ($\times 100W$)	Range	indoor unit pipe length	Pipe size Gas/Liquid
a	140	$A \geq 56$	Suppose $\leq 10m$	$\Phi 15.9/\Phi 9.5$
b	140	$A \geq 56$	Suppose $\leq 10m$	$\Phi 15.9/\Phi 9.5$
c	140	$A \geq 56$	Suppose $\leq 10m$	$\Phi 15.9/\Phi 9.5$
d	140	$A \geq 56$	Suppose $> 10m$	$\Phi 19.1/\Phi 12.7$
e	140	$A \geq 56$	Suppose $> 10m$	$\Phi 19.1/\Phi 12.7$
f	71	$A \geq 56$	Suppose $\leq 10m$	$\Phi 15.9/\Phi 9.5$
g	71	$A \geq 56$	Suppose $\leq 10m$	$\Phi 15.9/\Phi 9.5$
h	140	$A \geq 56$	Suppose $\leq 10m$	$\Phi 15.9/\Phi 9.5$
i	56	$A \geq 56$	Suppose $\leq 10m$	$\Phi 15.9/\Phi 9.5$
j	56	$A \geq 56$	Suppose $> 10m$	$\Phi 19.1/\Phi 12.7$

1.1.3.2 Select main pipe(L1),indoor main pipe(L2-L9),indoor branch(A-I) according to the table 4-4

Indoor main pipe/ indoor branch	Total capacity of indoor units ($\times 100W$)	Range	Pipe dimension (Gas/Liquid)	Branch
L3/C	$N1+N2=280$	$230 \leq A < 330$	$\Phi 22.2/\Phi 9.5$	FQZHN-02C

L4/D	N3+ N4=280	230≤A<330	Φ22.2/Φ9.5	FQZHN-02C
L2/B	N1+.....+N4=560	460≤A<660	Φ28.6/Φ15.9	FQZHN-03C
L7/G	N6+N7=142	A<166	Φ15.9/Φ9.5	FQZHN-01C
L6/F	N5+.....+N7=282	230≤A<330	Φ22.2/Φ9.5	FQZHN-02C
L9/I	N9+N10=136	230≤A<330	Φ22.2/Φ9.5	FQZHN-02C
L8/H	N8+.....+N10=276	230≤A<330	Φ22.2/Φ9.5	FQZHN-02C
L5/E	N5+.....+N10=558	460≤A<660	Φ28.6/Φ15.9	FQZHN-03C
L1/A	N1+.....+N10=1118	920≤A<1350	Φ38.1/Φ19.1	FQZHN-04C

1.1.3.3 Select main pipe(L1) and outdoor unit pipe(g1-g3,G1), outdoor branch,

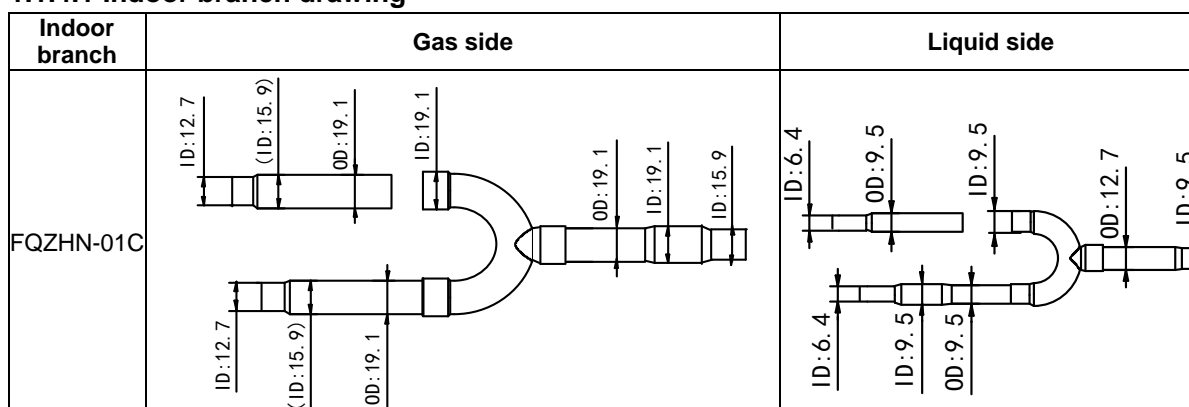
Main pipe/outdoor unit pipe/branch	Model	The Max. equivalent pipe length≥ 90m	Range	Branch	Refer to
		Gas Side/ Liquid Side			
g1	10HP	Φ25.4 (Welding)/ Φ12.7(Flaring Nut)	8≤W3≤10HP	/	according to the table 4-7
g2	14HP	Φ31.8(Welding)/15.9 (Flaring Nut)	12≤W2≤16HP	/	
g3	16HP	Φ31.8(Welding)/15.9 (Flaring Nut)	12≤W1≤16HP	/	
G1	24HP	Φ38.1(Welding)/ Φ19.1(Welding)	Two modular combination	/	according to the table 4-5
L1	40HP	Φ38.1(Welding)/ Φ19.1(Welding)	34-48HP	/	
L+M	/	/	Three modular combination	FQZHW-03N1C	according to the table 4-7

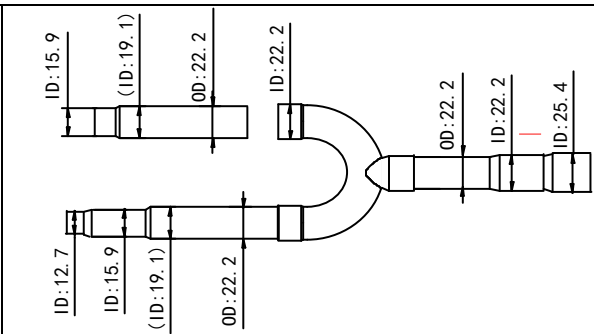
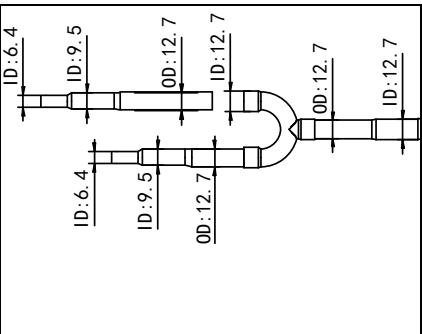
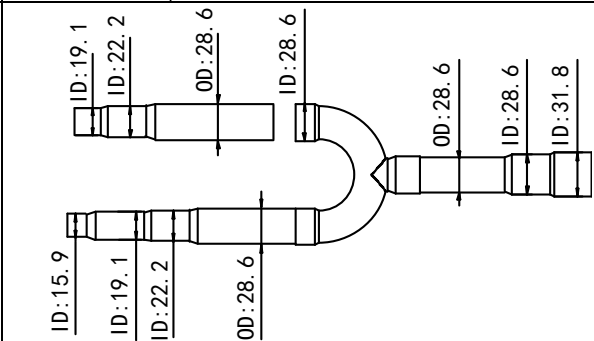
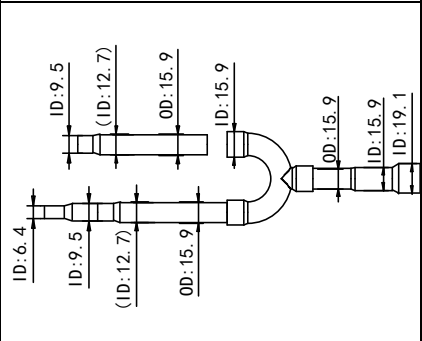
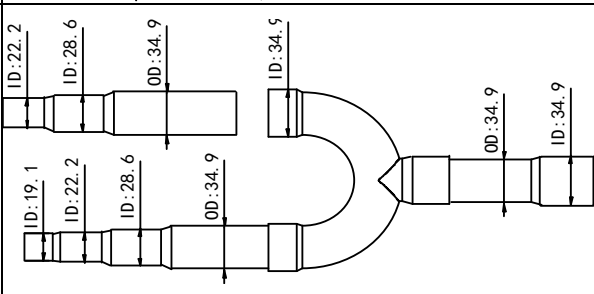
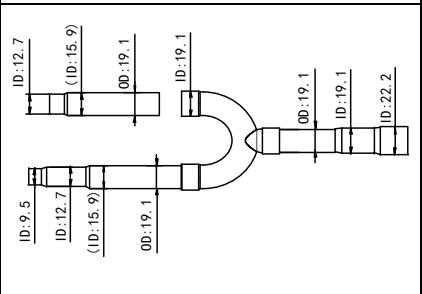
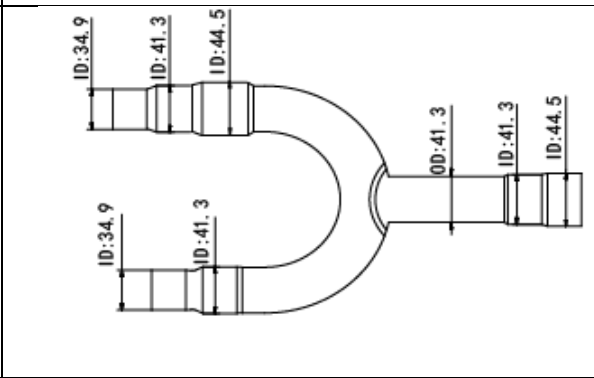
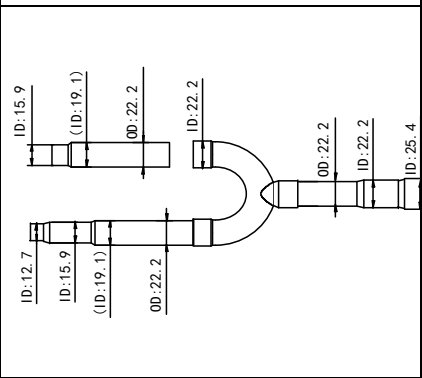
1.1.3.4 Compare the total capacity from indoor side and outdoor side, select the main pipe dia. according to the bigger one.

Main pipe L1 in the Fig.4-3, which upstream outdoor units total capacity is 10+12+16=38, base on table.4-5, the gas/liquid pipe diameter are Φ38.1/Φ22.2, total capacity of the downstream indoor unit is $140 \times 6 + 56 \times 2 + 71 \times 2 = 1094$, base on table.4-4, the gas/liquid pipe diameter are Φ38.1/Φ19.1, take the large one for your selection, final confirm the main pipe diameter is: gas/liquid pipe Φ38.1/Φ22.2.

1.1.4 Branch drawing

1.1.4.1 Indoor branch drawing



FQZHN-02C		
FQZHN-03C		
FQZHN-04C		
FQZHN-05C		

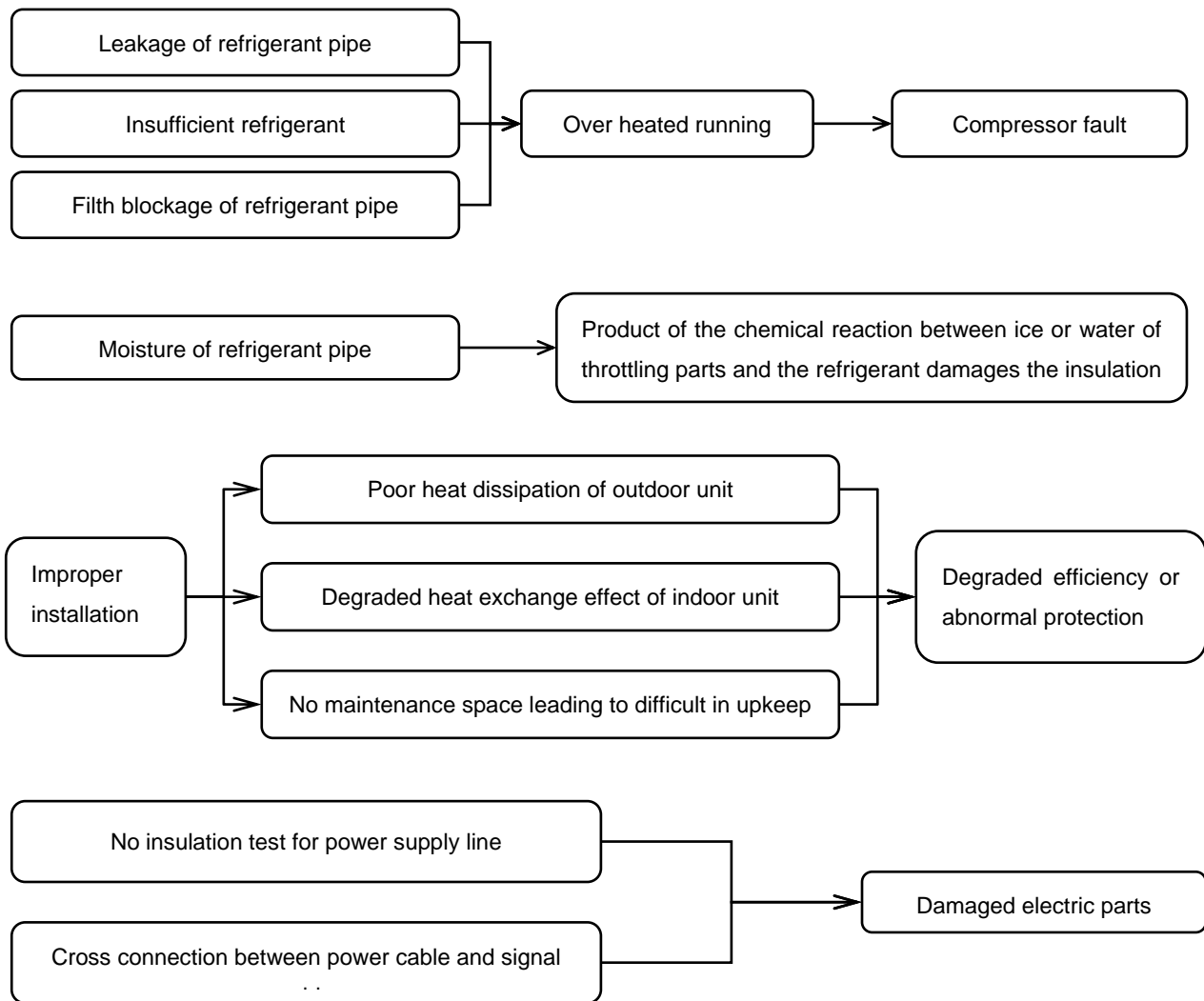
1.1.4.2 Outdoor branch drawing

Outdoor branch	FQZHW-02N1C	FQZHW-03N1C	FQZHW-04N1C
Gas side			
Liquid side			
Oil balance pipe	/		 (2 pcs)

1.3 Installation Procedure

1.3.1 Importance of the Installation Operation

Effect of installation issues on equipment:



1.3.2 General procedure

Pipe pre-install engineeringEnsure that the water drainage pipe inclines downward



Installing indoor unit

Make sure the model is correct.



Refrigerant piping engineeringKeep the refrigerant pipes dry, clean and sealed



Water drainage piping engineeringDownward inclination



Air duct engineeringEnsure sufficient ventilation rate



Thermal insulation engineeringEnsure no gap between the thermal insulation materials



Electric engineeringSelect proper power cables

(signal cable, power cable) (Signal cable should use 3-cores shielded wires)



On-site setup Follow the wiring diagram (to avoid incorrect setup)

Basement work for outdoor unitAvoid short-circuit ventilation and ensure sufficient maintenance space



Installing outdoor unitAvoid short-circuit ventilation and ensure sufficient maintenance space



Air tightness testCheck whether the air pressure remains at 4.0Mpa
(R410a) after correction is made within 24 hours



Vacuum drying Use vacuum pump that has a vacuum degree of less than
-775mmHg



recharging refrigerantRecord the amount of refrigerant to be recharged on the
outdoor unit and document it



Installing decorative panelEnsure no gap between decorative panel and ceiling



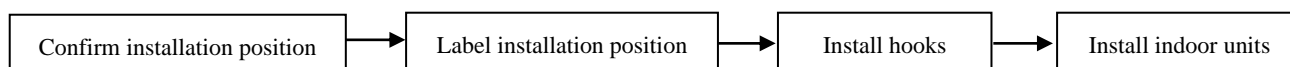
Test Running and commissioningRun the indoor units one by one to check whether any
pipe or cable is incorrectly installed



Delivering operation instructionsDeliver related materials while providing operation instruction
to the user

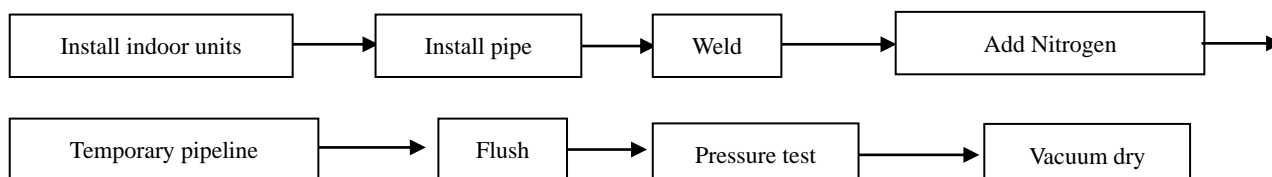
Note: The general procedure for refrigerant machine is subject to change according to the situation

1.3.2 Install indoor unit's procedure

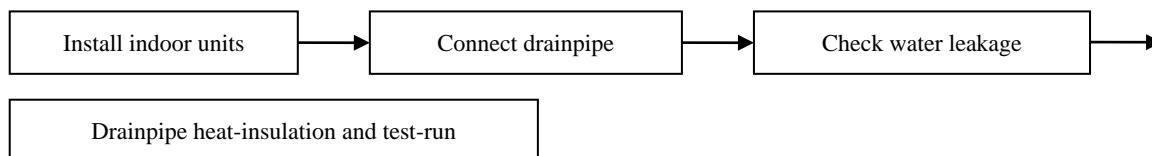


- Note:**
1. The hook must strong enough to sustain the weight of indoor unit.
 2. Check the models of indoor units before installation.
 3. Pay attention to the main devices, such as the pipeline.
 4. Hold enough places for maintenance.

1.3.3 Refrigerant pipe procedure



1.3.4 Drainage pipe procedure



Note: It is no need to insulate the drainpipe if you choose the plastic pipe as drainpipe.

1.3.5 Electric wiring

1.3.5.1 Please select power supply for indoor unit and outdoor unit separately. Both indoor units and outdoor units should be grounded well.

1.3.5.2 The power supply should have specified branch circuit with leakage protector and manual switch.

1.3.5.3 Please put the connective wiring system between indoor unit and outdoor unit with refrigerant piping system together.

1.3.5.4 Power wiring should be done by professional electrician and complied with relevant National Electric Standard.

1.3.5.5 The power supply, leakage protector and manual switch of all the indoor units connecting to the same outdoor unit should be universal. (Please set all the indoor unit power supply of one system into the same circuit.)

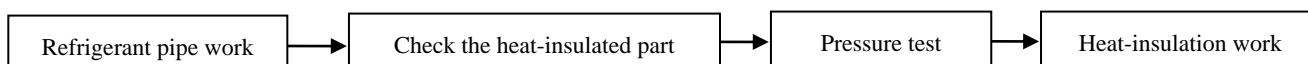
1.3.5.6 It is suggested to use 3-core shielded wire as signal wire between indoor and outdoor units, multi-core wire is unavailable. Pay attention to the consistency. When signal wire parallel to the power wire, please keep enough distance (about 300mm at least) to prevent interference.

1.3.5.7 The power wire and signal wire can't be enlaced together.

1.3.6 Lay the indoor pipeline

Note: Collocate the air-outlet reasonably to prevent airflow short-circuit. Check the static pressure whether in the allowable range. The air filters should be easy to unpick and wash. Do pressure test on pipeline.

1.3.7 Heat-insulation procedure



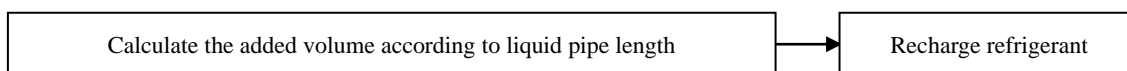
Note: For welding part, flare part and branch pipe, heat-insulation work must be done after finished the pressure test.

1.3.8 Install outdoor unit

Note: 1. Gutter must be set around the foundation to drain the condensation water.

2. When installing outdoor units at the roof, please check the strength of the roof and pay attention not to destroy the waterproof of the roof.

1.3.9 Recharge refrigerant procedure



Note: Please calculate the additional amount of refrigerant according to the formula that we supply to you, and the calculation result must be correct

1.3.10 Main points of test running and Commissioning

Please check the following issues before turning on the power:

1.3.10.1 Vacuum dry: Make sure the vacuum degree accord with our requirement about 10^{-5} .

1.3.10.2 Wiring: Includes the power wiring and communication wiring; Recheck the connection according to our corresponding wire diagrams. Especially, please remember our communication wire is polar; it means you must connect the communication wire correspondingly to the terminal block.

1.3.10.3 Additional charge of refrigerant: Recheck the calculation formula and recalculate the total recharge volume according to our supplied formula.

1.3.10.4 Open the stop-valve of gas and liquid pipe with Allen key; Check leakage of stop-valve with soap water. Please confirm whether the outdoor unit has been connected to the power for 12hr before start test running.

Test running: Turn on all of the indoor units with cooling mode and set the temperature in 17degree with high fan speed first, after the system operated, test following operation parameters of the system, including indoor units and outdoor units parameters.

1.4 Installation Preparation

1.4.1 Installation tools and instruments

All the necessary tools should be available, and their models and specifications should meet the installation and technical requirements. The instruments and meters should be tested or verified, and their scales and accuracy should meet the requirements. The common tools for installing refrigerant machine are listed below.

No.	Name	Specification/Model	No.	Name	Specification/Model
1	Pipe cutter		15	Electronic scale	
2	Steel saw		16	Stop	
3	Pipe bender	Spring, mechanic	17	Thermometer	
4	Pipe expander	Depend on the pipe diameter specification	18	Meter rule	
5	Flaring tool	Depend on the pipe diameter specification	19	Screw driver	"-", "+"
6	Brazing welder	Depend on the nozzle size		Adjustable spanner	
7	Scraper		21	Resistance tester	
8	File/Rasp		22	Electro probe	
9	Injection tube		23	Multimeter	
10	Double-ended pressure gauge	4.0MPa	24	Pressure reducing valve	
11	Pressure gauge	1.5MPa, 4.0MPa	25	Wire pliers	
12	Vacuum gauge	-756mmHg	26	Clamping pliers	
13	Vacuum pump	At least 4 liters/second	27	Hexagon ring spanner	
14	Horizontal rule		28	Torque wrench	

In addition, tools such as electric welder, cutter, A-shape ladder, electric drill, folding machine, forming machine, nitrogen cylinder are also generally used during the installation.

1.4.2 Audit of construction drawings

Before the engineering installation, read carefully the related drawings to understand the design intention, audit the drawings, and then work out a detailed engineering organization plan.

1. Make sure that the pipe diameters and branch pipe models meet the technical specifications.
2. Ratio of slope, drainage mode and thermal insulation of condensate water.
3. Making of air duct and air opening, and air ventilation organization.
4. Configuration specifications, model and control mode of power cables.
5. Making, total length and control mode of control cable.

The engineering construction staff should follow the construction drawing strictly during the construction. If any change is required, such change should be approved by the design department and be documented.

1.4.3. Construction organization plan

Construction organization plan serves as the comprehensive technical and economic documents that guide the construction preparation and scientific construction organization. A reasonable construction organization plan and careful implementation of it are essential to ensure smooth construction, shorten construction period, ensure construction quality, and improve economic results.

The construction plan should be concise and focuses on key procedures, construction method, and time coordination, space disposal of the construction around the features of the engineering, thus to ensure smooth construction operation.

1.4.4. Training of installation team

Establish sound training mechanisms. Service engineers are required to train installation team managers, work supervisors to train workers, and managers to train workers of special type. Establish a management mechanism in which pre-working training, before-shift disclosure and after-shift implementation are available.

1.4.5. Coordination with other sectors

Ensure smooth coordination and meticulous organization between these sectors: air conditioning, civil work, electricity, water supply and drainage, fire protection, decoration, intelligence, etc. Try best to lay pipes of the air conditioning system along the bottom of the beam. If pipes meet together at the same height, follow these principles:

1. Ensure that gravity pipes take precedence over water drainage pipes, air ducts and pressure pipes.
2. Ensure that large pipes take precedence over air ducts and small pipes.

1.4.6. Pipe pre-install engineering

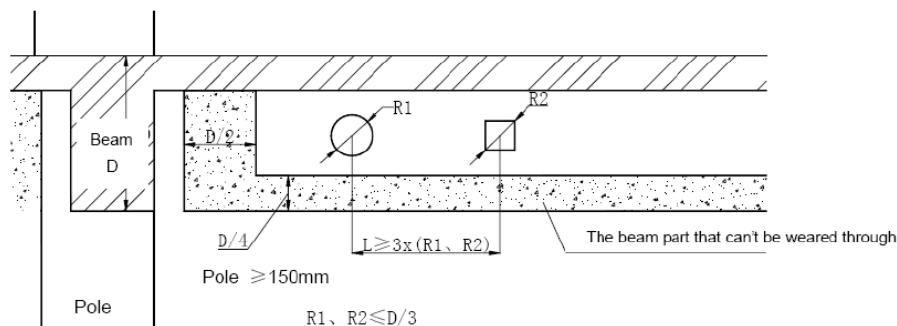
1.4.6.1. Operation procedure

Raise requirements to the civil work sector and coordinate → Determine the position, size and quantity of the machines, and conduct pre-installing → Check the pre-installing results

1.4.6.2. Pipeline route

1. The pipe for condensate water should have a downward slope (the slope should be at least 1/100).
2. The diameter of the through hole for the refrigerant pipe should take the thickness of the thermal insulation material into consideration (it is recommended to lay the gas pipe and liquid pipe in two separate columns).
3. Note that sometimes through hole is not allowed because of the structure of the beam.

eg. Strengthen the transfixion hole



Highlights:

- 1) When selecting the parts to be pre-installed, ensure that the weight of the accessories is also calculated.
- 2) In a situation where metal parts to be pre-installed is not allowed, use expansion bolts while ensuring sufficient load-bearing capacity.

Caution: The above figure is for reference only. It is not recommended to dig holes on either the beam or the shear wall. If such operation is indeed needed, please consult the property owner (or manager) and the civil work sector, and get written approval from the competent authority.

1.4.7 Warning

- (1) Be sure only trained and qualified service personnel to install, repair or service the equipment.

Improper installation, repair, and maintenance may result in electric shocks, short-circuit, leaks, fire or other damage to the equipment.

- (2) Install according to this installation instructions strictly.

If installation is defective, it will cause water leakage, electrical shock fire.

- (3) When installing the unit in a small room, take measures against to keep refrigerant concentration from exceeding allowable safety limits in the event of refrigerant leakage.

Contact the place of purchase for more information. Excessive refrigerant in a closed ambient can lead to oxygen deficiency.

- (4) Use the attached accessories parts and specified parts for installation. otherwise, it will cause the set to fall, water leakage, electrical shock fire.

- (5) Install at a strong and firm location which is able to withstand the set's weight.

If the strength is not enough or installation is not properly done, the set will drop to cause injury.

- (6) The appliance must be installed 2.5m above floor.

- (7) The appliance shall not be installed in the laundry.

- (8) Before obtaining access to terminals, all supply circuits must be disconnected.

- (9) The appliance must be positioned so that the plug is accessible.

- (10) The enclosure of the appliance shall be marked by word, or by symbols, with the direction of the fluid flow.

- (11) For electrical work, follow the local national wiring standard, regulation and installation instruction. An independent circuit and single outlet must be used.

If electrical circuit capacity is not enough or defect in electrical work, it will cause electrical shock fire.

- (12) Use the specified cable and connect tightly and clamp the cable so that no external force will be acted on the terminal.

If connection or fixing is not perfect, it will cause heat-up or fire at the connection.

- (13) Wiring routing must be properly arranged so that control board cover is fixed properly.

If control board cover is not fixed perfectly, it will cause heat-up at connection point of terminal, fire or electrical shock.

- (14) If the supply cord is damaged, it must be replaced by the manufacture or its service agent or similarly qualified person in order to avoid a hazard.

- (15) An all-pole disconnection switch having a contact separation of at least 3mm in poles should be connected in fixed wiring.

- (16) When carrying out piping connection, take care not to let air substances go into refrigeration cycle.

Otherwise, it will cause lower capacity, abnormal high pressure in the refrigeration cycle, explosion and injury.

(17) Do not modify the length of the power supply cord or use of extension cord, and do not share the single outlet with other electrical appliances.

Otherwise, it will cause fire or electrical shock.

(18) Carry out the specified installation work after taking into account strong winds, typhoons or earthquakes.

Improper installation work may result in the equipment falling and causing accidents.

Remark: Failure to observe a warning may result in death.

1.4.8 Caution

(1) Ground the air conditioner.

Do not connect the ground wire to gas or water pipes, lightning rod or a telephone ground wire. Incomplete grounding may result in electric shocks.

(2) Be sure to install an earth leakage breaker.

Failure to install an earth leakage breaker may result in electric shocks.

(3) Connect the outdoor unit wires, and then connect the indoor unit wires.

You are not allowed to connect the air conditioner with the power source until wiring and piping the air conditioner is done.

(4) While following the instructions in this installation manual, install drain piping in order to ensure proper drainage and insulate piping in order to prevent condensation.

Improper drain piping may result in water leakage and property damage.

(5) Install the indoor and outdoor units, power supply wiring and connecting wires at least 1 meter away from televisions or radios in order to prevent image interference or noise.

Depending on the radio waves, a distance of 1 meter may not be sufficient enough to eliminate the noise.

(6) The appliance is not intended for use by young children or infirm persons without supervision. Young children should be supervised to ensure that they do not play with the appliance.

(7) Don't install the air conditioner in the following locations:

There is petrolatum existing.

There is salty air surrounding (near the coast).

There is caustic gas (the sulfide, for example) existing in the air (near a hot spring).

The Volt vibrates violently (in the factories).

In buses or cabinets.

In kitchen where it is full of oil gas.

There is strong electromagnetic wave existing.

There are inflammable materials or gas.

There is acid or alkaline liquid evaporating.

Other special conditions.

(8) The insulation of the metal parts of the building and the air conditioner should comply with the regulation of National Electric Standard.

Remark: Failure to observe a caution may result in injury or damage to the equipment.

2. Units Installation

2.1. Installation of Indoor Unit

2.1.1 Installation procedure

Determine the installation position → Scribing and locating → Installing suspension road → Installing the indoor unit

2.1.2 Cautions for installation and check

- 1) Drawing check: Confirm the specification, model and installation direction of the set.
- 2) Height: Ensure that it closely fits the ceiling.
- 3) Suspension strength: The suspension road shall be strong enough to bear the weight twice of the indoor unit to ensure that no abnormal vibration or noise is generated when the set is running.
- 4) When installing the indoor unit, ensure that sufficient space is available for installing condensate water pipe.
- 5) Horizontal degree: It shall be kept within $\pm 1^\circ$.

Purpose: Ensure smooth drainage of condensate water. Also ensure stability of the machine body to induce the risks caused by vibration and noise.

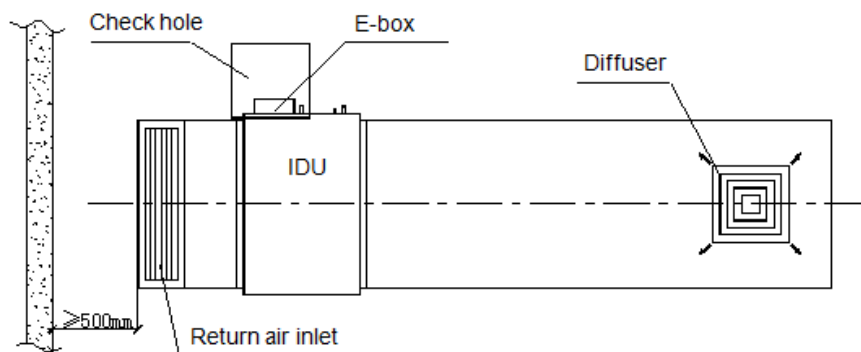
Hidden trouble of incorrect operation: a. Water leakage; b. Abnormal vibration and noise

- 6) Ensure sufficient maintenance & upkeep is available (keep a large enough maintenance hole, typically 400x400mm).

- 7) Avoid short-circuit ventilation.

Purpose: Ensure sufficient heat exchange of indoor unit and good air conditioning effect.

Risk of incorrect operation: Poor air conditioning effect; abnormal protection of the set.



2.2. Installation of Outdoor Unit

2.2.1. Acceptance and unpacking

1. After the machine arrives, check whether it is damaged during the shipment. If the surface or inner side of the machine is damaged, submit a written report to the shipping company.
2. Check whether the model, specification and quantity of the equipment conform to the contract.
3. After removing the outer package, please keep the operation instructions well and count the accessories.

2.2.2. Hoisting outdoor unit

Do not remove any package before the hoisting. Use two ropes to hoist the machine, keep the machine in balance, and then raise it safely and steadily. In case of no package or if the package is damaged, use plates or packing material to protect it.

When conveying and hoisting the outdoor unit, keep it upright, ensure that the slope does not exceed 30° , and keep safety in mind.

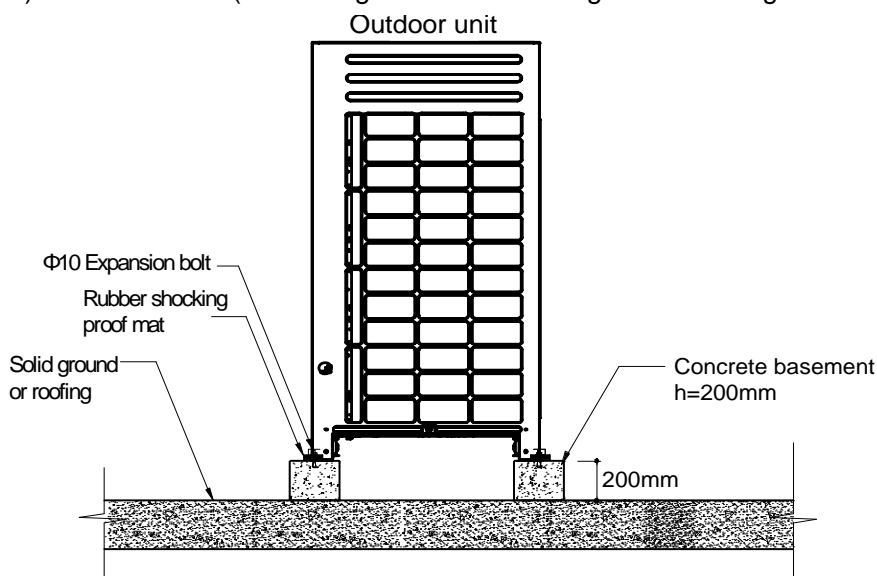
2.2.3. Selecting installation position

1. Ensure that the outdoor unit is installed in a dry, well-ventilated place.

2. Ensure that the noise and exhaust ventilation of the outdoor unit do not affect the neighbors of the property owner or the surrounding ventilation.
3. Ensure that the outdoor unit is installed in a well-ventilated place that is possibly closest to the indoor unit.
4. Ensure that the outdoor unit is installed in a cool place without direct sunshine exposure or direct radiation of a high-temperature heat source.
5. Do not install the outdoor unit in a dirty or severely polluted place, so as to avoid blockage of the heat exchanger in the outdoor unit.
6. Do not install the outdoor unit in a place with oil pollution, salt or high content of harmful gases such as sulfurous gas.

2.2.4. Base for outdoor unit

1. A solid, correct base can:
 - 1) Avoid the outdoor unit from sinking.
 - 2) Avoid the abnormal noise generated due to base.
2. Base types
 - 1) Steel structure base
 - 2) Concrete base (see the figure below for the general making method)



Remark:

The key points to make basement:

- 1) The master unit's basement must be made on the solid concrete ground. Refer to the structure diagram to make concrete basement in detail, or make after field measurements.
- 2) In order to ensure every point can contact equality, the basement should be on completely level.
- 3) If the basement is placed on the roofing, the detritus layer isn't needed, but the concrete surface must be flat. The standard concrete mixture ratio is cement 1/ sand 2/ carpolite 4, and adds Φ10 strengthen reinforcing steel bar, the surface of the cement and sand plasm must be flat, border of the basement must be chamfer angle.
- 4) In order to drain off the seeper around the equipment, a discharge ditch must be setup around the basement.
- 5) Please check the affordability of the roofing to ensure the load capacity.

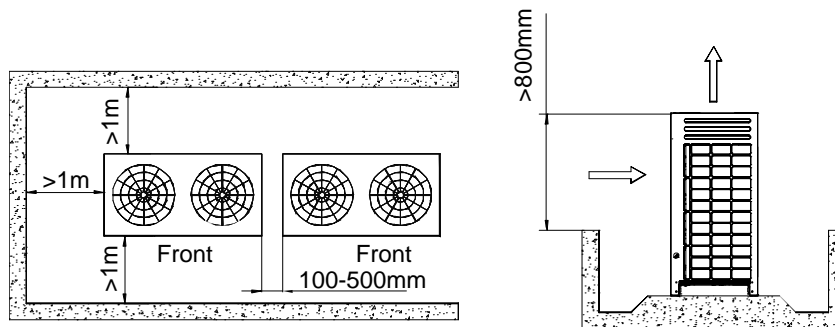
2.2.5. Installation highlights for outdoor unit

1. Install vibration isolator or isolating pad between the set and the base by the design specification.
2. Ensure close between the outdoor unit and the base, or significant vibration and noise may occur.

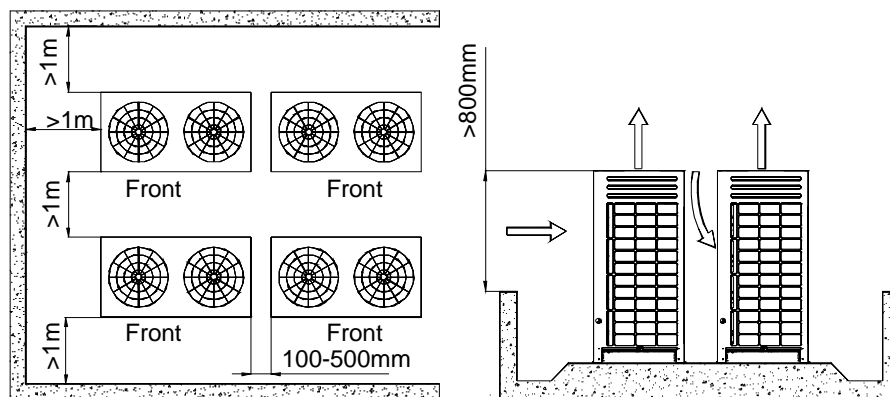
3. Ensure that outdoor unit is well grounded.
4. Before commissioning, do not turn on the valves of the gas pipe and liquid pipe of the outdoor unit.
5. Ensure sufficient maintenance space is available at the installation site.

2.2.6. Installation space for outdoor unit.

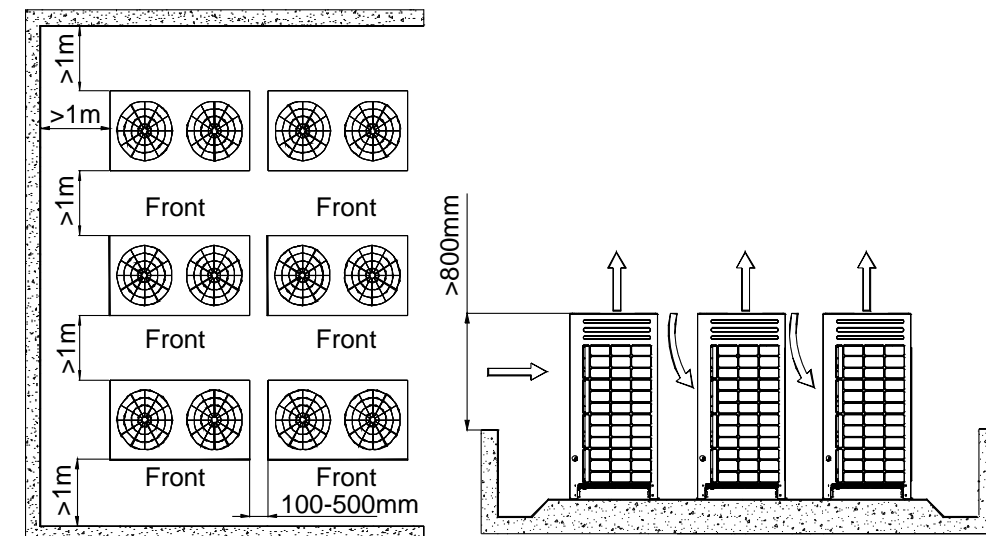
1) One row:



2) Two rows

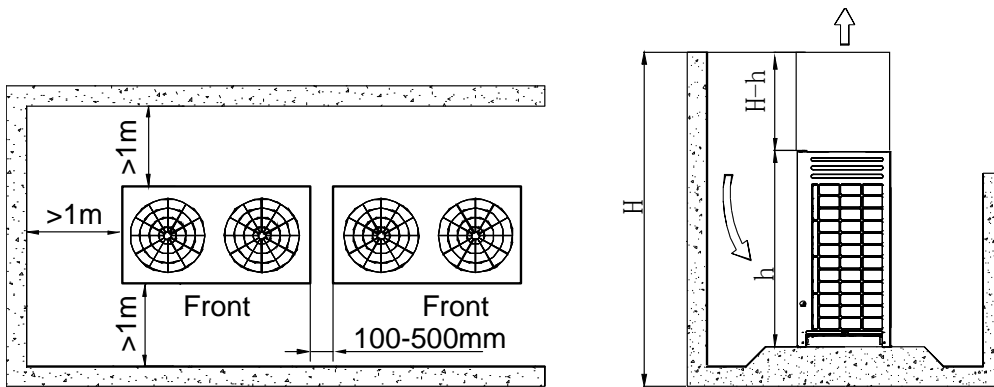


3) More than two rows



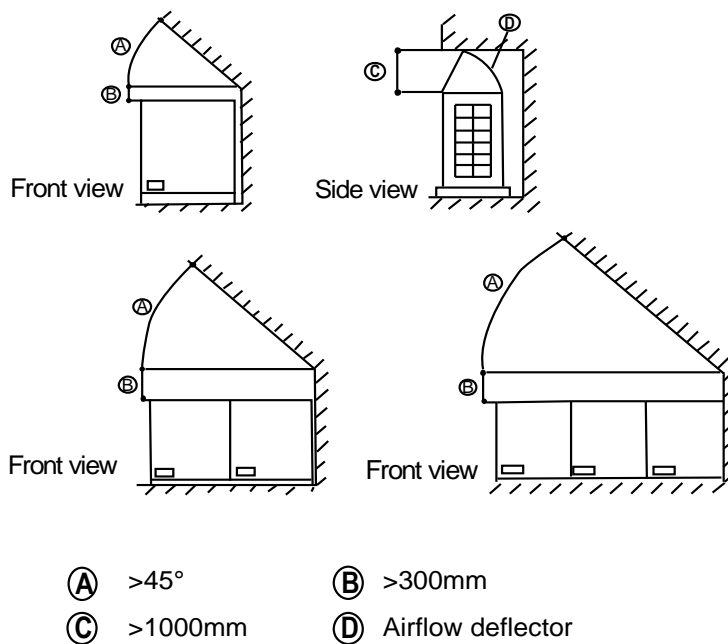
4) When the outdoor unit is lower than the surrounding obstacle,

Refer to the layout used when the outdoor unit is higher than the surrounding obstacle. However, to avoid cross connection of the outdoor hot air from affecting the heat exchange effect, please add an air director onto the exhaust hood of the outdoor unit to facilitate heat dissipation. See the figure below. The height of the air director is H_D (namely $H-h$). Please make the air director on site.



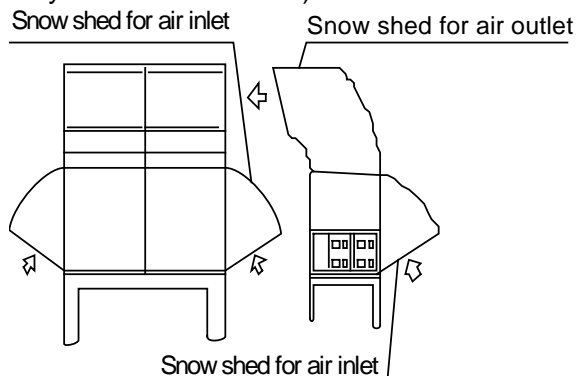
5) For limited space installation

The dimensions should meet the request according to the marks, otherwise, a mechanic exhaust device must be added.



6) Set the snow-proof facility

In snowy areas, facilities should be installed to prevent snow. (See the figure below) (defective facilities may cause malfunction.) Please lift the bracket higher and install snow shed at the air inlet and air outlet.

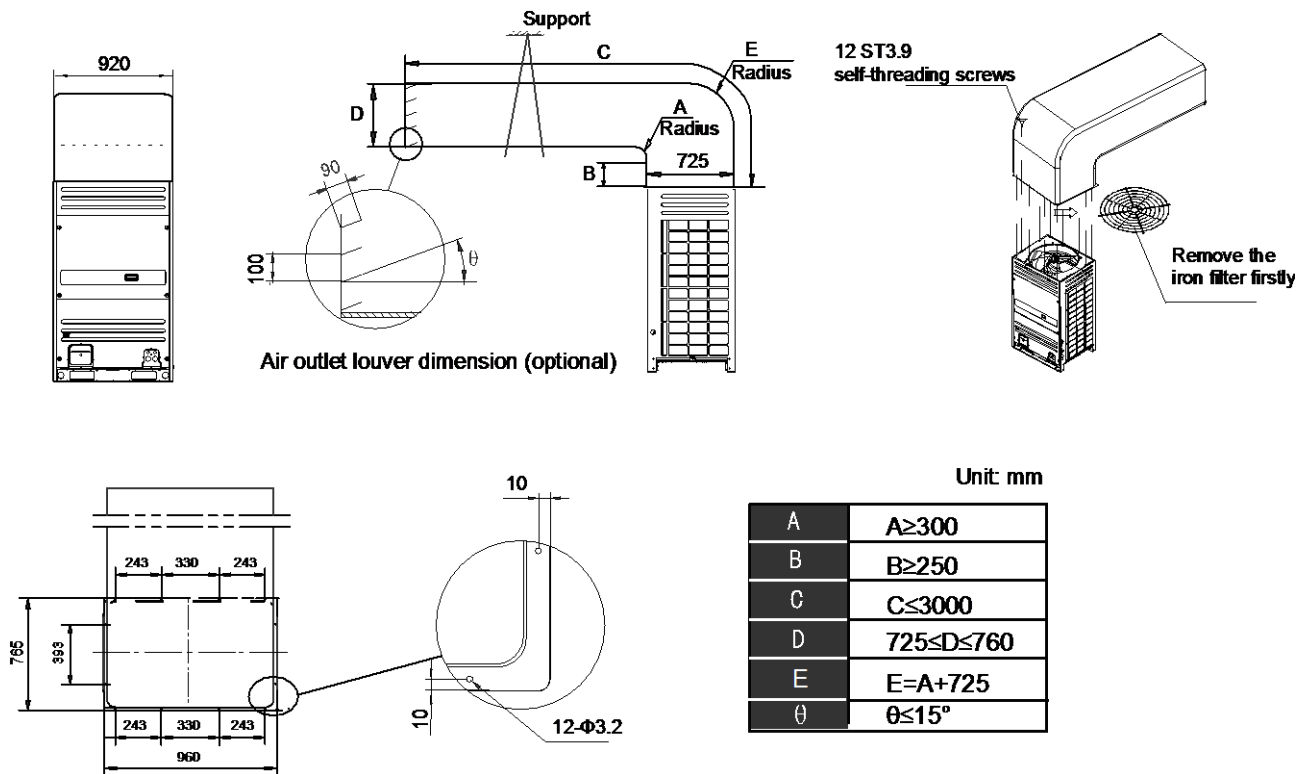


2.2.7. Mount the air deflector

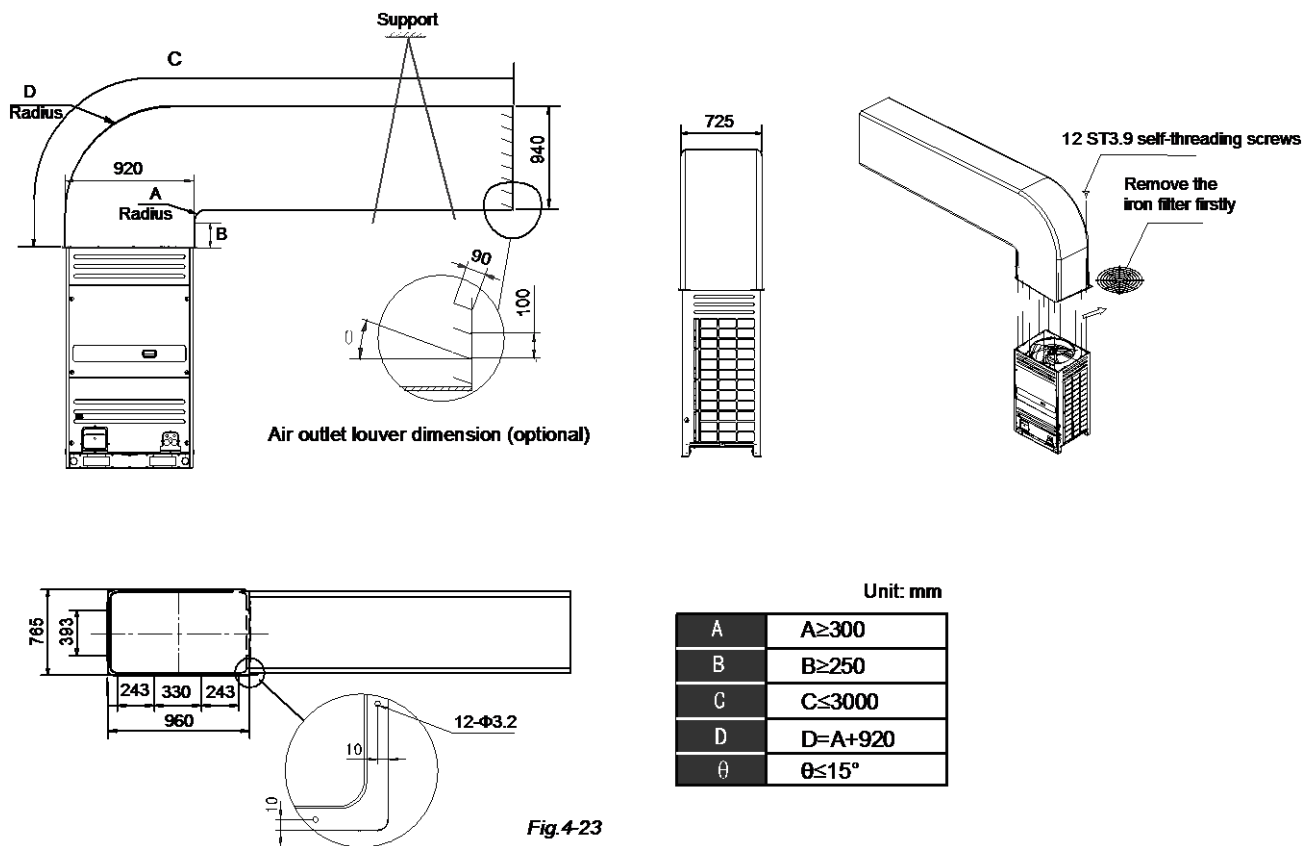
When installing, takes off the mesh firstly, and then conduct in according of the following two schedules.

2.2.7.1 Installation of 8HP,10HP.

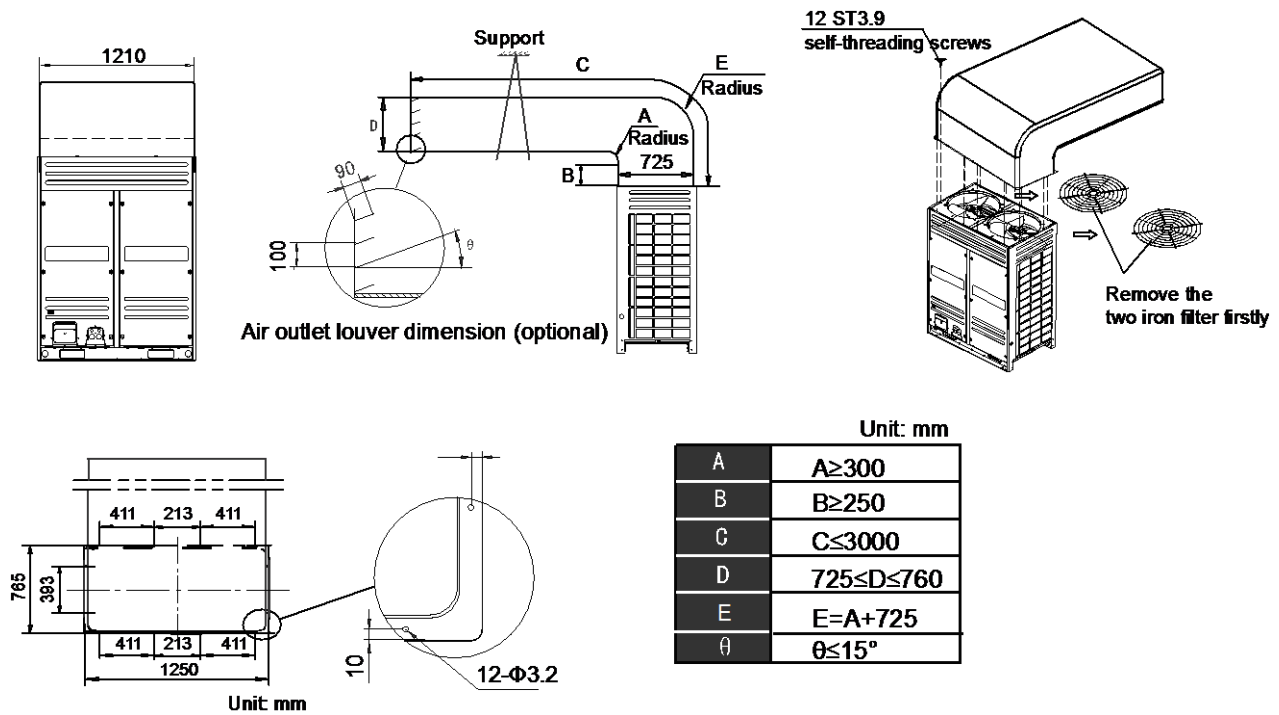
Schedule 1:



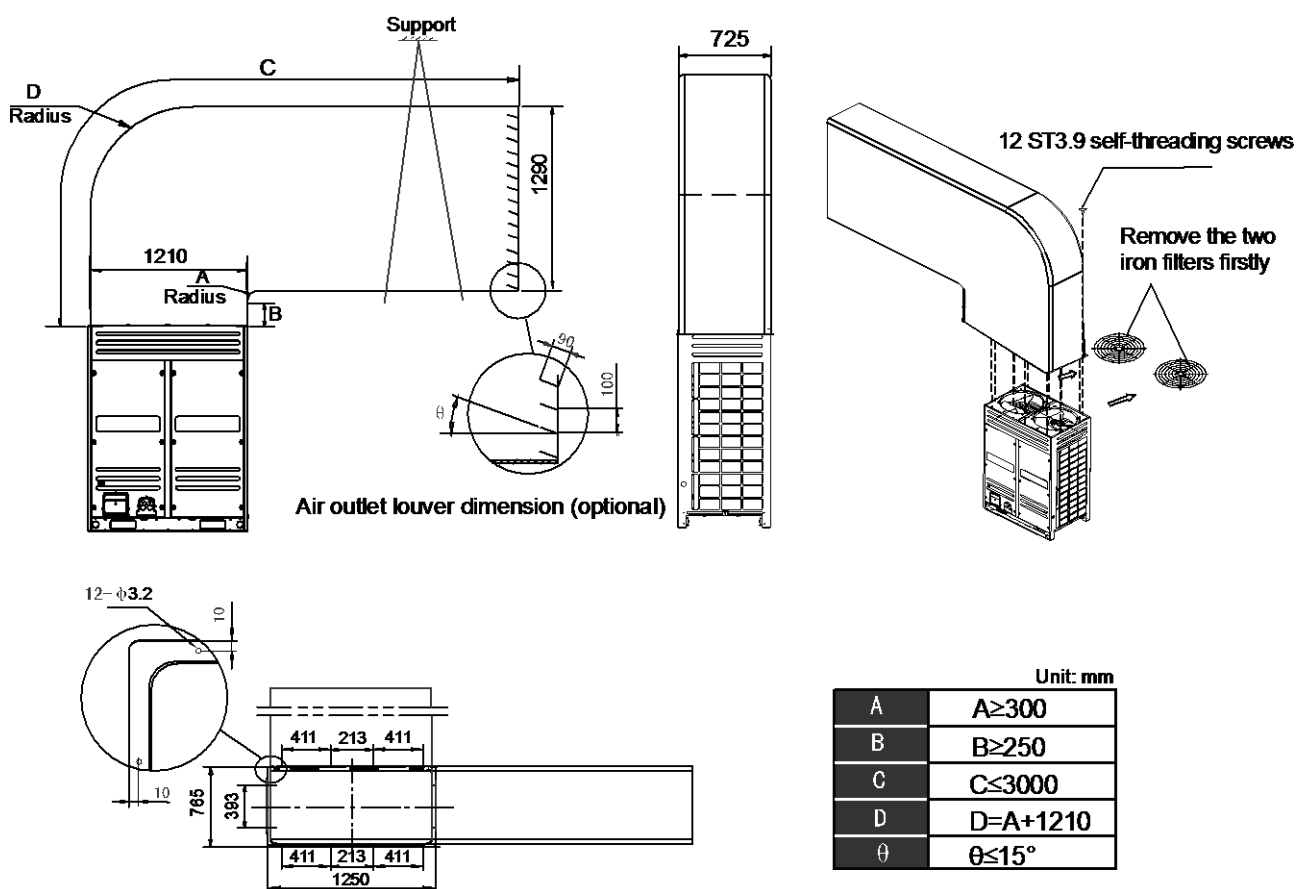
Schedule 2:



2.2.7.2 Installation of 12HP,14HP,16HP



Schedule 2:



Note: Before install the air deflector, please ensuring the mesh enclosure has been took off; otherwise the air supply efficiency would be block down.

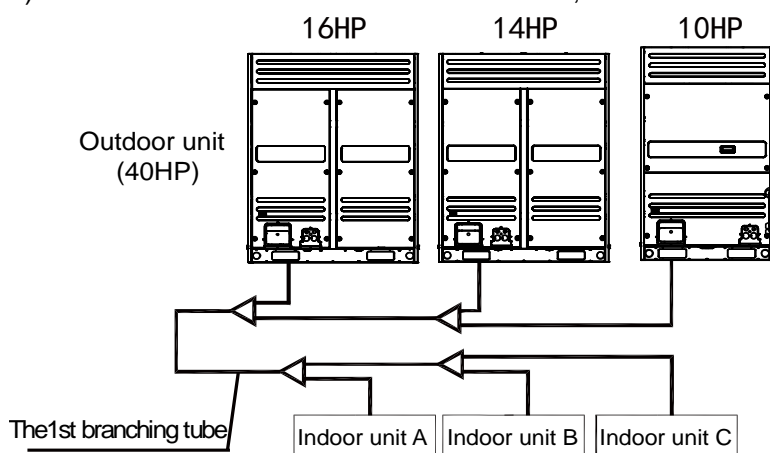
Once mounting the shutter to the unit, air volume, cooling (heating) capacity and efficiency would be block down, this affection enhance along with the angle of the shutter. Thus, we are not recommend you to mount the shutter, if necessary in use, please adjust the angle of shutter no larger than 15°. Only one bending site is allowed in the air duct, otherwise, device may be disoperation.

2.2.8. Arrangement of outdoor units

If more than two outdoor units are combined in the system, these outdoor units shall be arranged according to the descending order of their cooling capacity, and the outdoor unit with the highest cooling capacity shall be placed at the first branch pipe. In addition, the outdoor unit with the highest cooling capacity shall be set to master unit, while others shall be set to slave units.

The following takes a system with outdoor units of 40HP (10HP+14HP+16HP) as an example:

- 1) Place the outdoor unit of 16HP beside the first branch pipe (see the figure below)
- 2) Place the outdoor units in the descending order of their cooling capacity, namely, 16HP, 14HP and 10HP.
- 3) Set the outdoor unit of 16HP to master unit, and the outdoor units of 14HP and 10HP to slave unit.



Remark: All the outdoor units should be installed on the location of same level, or it may cause imbalance of refrigerant distributing and lead the fault of the compressors.

Although the V4+ K series outdoor units can auto balance the load due to the master free cycle duty operation, but it is still recommended to install the biggest unit close to the first branch and set as master also.

3. Refrigerant Pipe Engineering

3.1. Refrigerant Pipe Processing

3.1.1 Basic requirements

3.1.1.1. Operation procedure

Determine the route and size of the pipeline according to the construction drawing → Make and installing

bracket, hanger and support → Make and arrange pipe accessories → Recharge nitrogen gas for protection

→ Brazing welding → Pipe flushing → air tightness test → Thermal insulation → Vacuum drying

3.1.1.2. Three principles for refrigerant piping

Item	Reasons	Countermeasure
Dry	The rain comes into/engineering water comes into produced condensate water in the pipe	The process of tubing must be criterion → Below cleanly → Vacuum
Cleanness	There are oxide produced by welding/outside dust/sundries comes into	Charge nitrogen gas to prevent when welding → Below cleanly Attention the cleanness during the piping process →
Air tightness	Imprecision weld /unqualified airproof to flaring pipe /leakage of the fringe	Use the suited welding rod to weld → Air tightness test Comply to the welding operation criteria → Comply to the bell mouth connecting operation criteria → Comply to the interface operation criteria →

Caution: Removing oil for copper pipe of a system that uses R410A

For the system that uses R410A, oil-free copper pipes should be selected (they can also be customized). If ordinary (oily) copper pipes are used, it must be cleaned with gauze that is dipped into tetrachloroethylene solution.

Purpose of cleansing copper pipe: Remove the lube (industrial oil used during the processing of the copper pipe) attached to the inner wall of the copper pipe. The ingredients of such lube are different from those of the lube used by the R410A refrigerant, and they will produce deposit through reaction, which may cause complicated system fault.

Special Note: Never use CCl₄ for pipe cleansing and flushing, or the system will be seriously damaged.

3.1.1.3. Support for refrigerant pipe

1. Fixing horizontal pipe

When the air conditioner is running, the refrigerant pipe will deform (for example, shrunk/expanded or inclined downward). To avoid pipe damage, use hanger or support to support it (see the table below for the criteria).

Pipe Diameter (mm)	Less than Φ20	Φ20-40	Larger than Φ40
Interval between support points (m)	1	1.5	2

In general, gas pipe and liquid pipe should be suspended in parallel, and the interval between support points should be selected according to the diameter of the air pipe. Since the temperature of the flowing refrigerant will change as the operation and working condition change, which will result in hot expansion and cold shrinkage of the refrigerant pipe, so the pipe with thermal insulation should not be clamped

tightly, otherwise the copper pipe may get broken due to stress concentration.

2. Fixing vertical pipe

Fix the pipe along the wall according to the pipeline route. Round log should be used at the pipe clip to replace thermal insulation material, "U"-shape pipe should be fixed outside the round log, and the round log should be provided with anticorrosion treatment.

Pipe Diameter (mm)	Less than $\Phi 20$	$\Phi 20-40$	Larger than $\Phi 40$
Interval between support points (m)	1.5	2.0	2.5

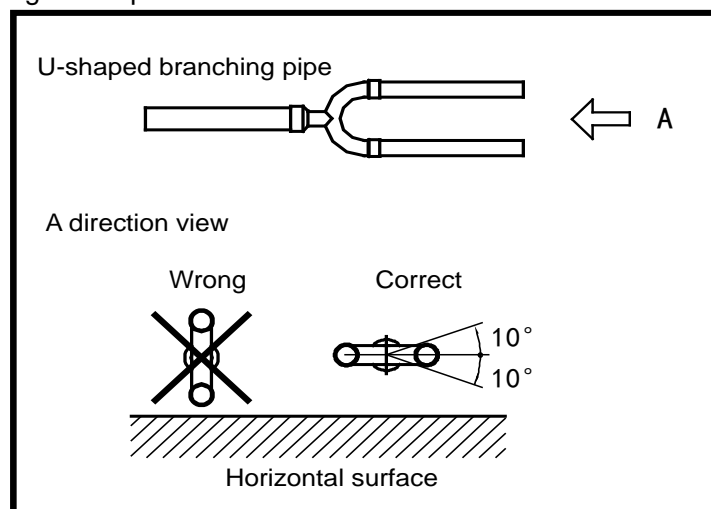
3. Local fixing

To avoid stress concentration due to expansion and shrinkage of the pipe, it is usually required to conduct local fixing beside the wall through-holes of the branch pipe and end pipe.

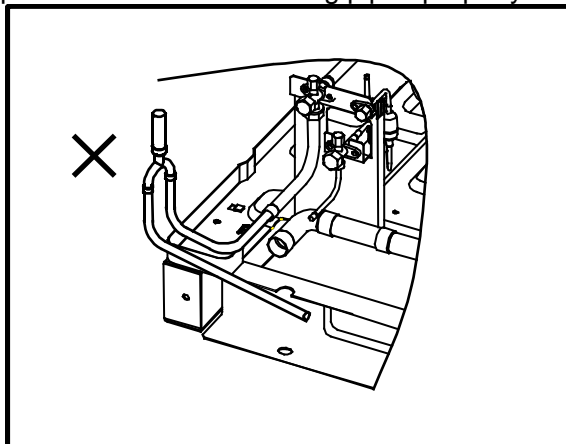
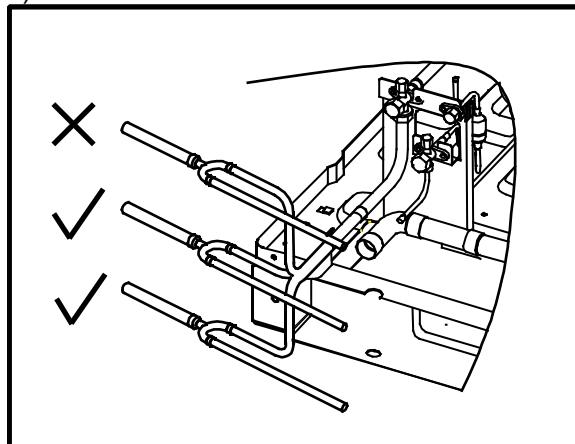
3.1.1.4.. Requirements for installing branch pipe subassembly

When laying the branch pipe subassembly, pay attention to the following:

- 1) Do not replace branch pipe with tee pipe.
- 2) Follow the construction drawing and installation instructions to confirm the models of branch pipe subassembly as well as the diameters of main pipe and branch pipe.
- 3) Neither sharp bend (an angle of 90°) nor connection to other branch pipe subassembly is allowed at places within 500mm away from the branch pipe subassembly.
- 4) Try best to install the branch pipe subassembly at a place that facilitates welding (if doing so is impossible, it is recommended to prefabricate the subassembly).
- 5) Install vertical or horizontal branch joint, and ensure that the horizontal angle is within 10° . Refer to the right side picture:

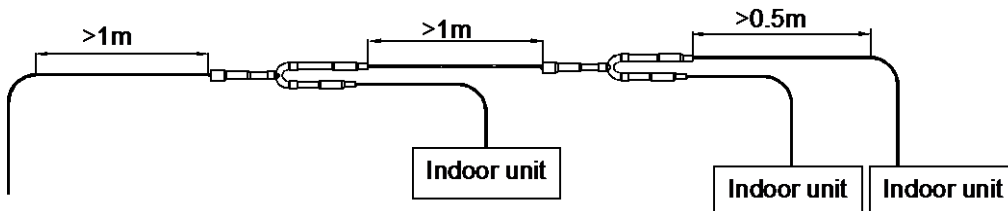


- 6) For avoid oil accumulate at the outdoor unit, please install the branching pipes properly.



7) To ensure even diversion of refrigerant, pay attention to the distance between the branch pipe subassembly and the horizontal straight pipe.

- Ensure that the distance between the bending point of copper pipe and the horizontal straight pipe section of the adjacent branch pipe is larger than or equal to 1m.
- Ensure that the distance between the horizontal straight pipe sections of the two adjacent branch pipes is larger than or equal to 1m.
- Ensure that the distance between the branch pipe and the horizontal straight pipe section used to connect the indoor unit is larger than or equal to 0.5m.



3.1.2. Storage and maintain of copper pipe

3.1.2.1. Pipe carriage and storage

- Avoid the pipe from bending or deforming during the carriage.
- Seal the openings of the copper pipe with end cover or adhesive tape during the storage.
- Place the coil upright to avoid compressing deformation due to self weight.
- Use wooden support to ensure that the copper pipe is higher than the ground, so as to make the pipe dust-proof and water-proof.
- Take dust-proof and water-proof measures at both ends of the pipe.
- Keep the pipes on special bracket or bench at specified place on the construction site.

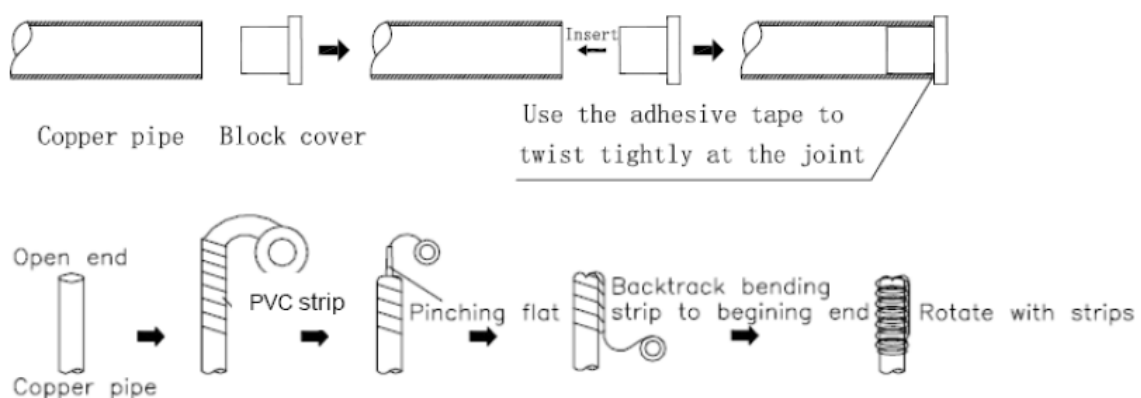
3.1.2.2. Correct to seal the opening

- There are two ways for opening sealing:

- 1) Sealing with cover or adhesive tape (suitable for short-term storage)
- 2) Sealing welding (suitable for long-term storage)

Caution: The openings of the copper pipe must be sealed at any time during the construction.

● Method of sealing with cover or adhesive tape



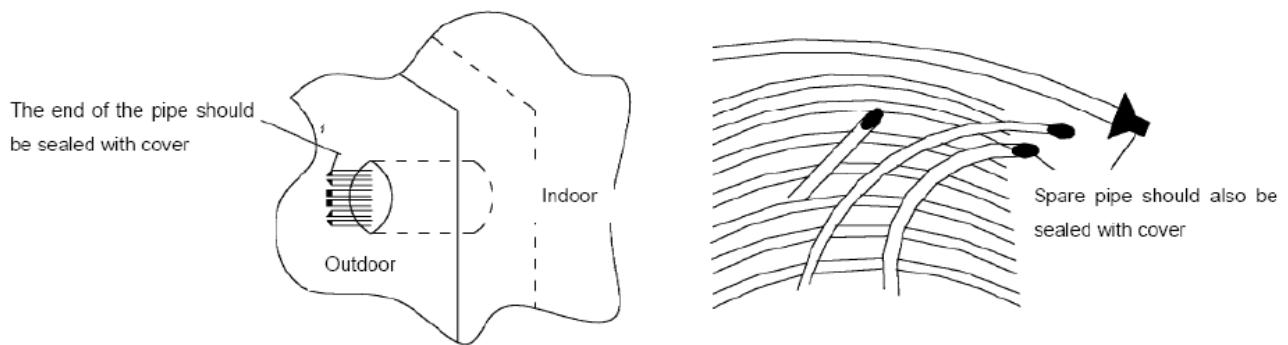
※ It is recommended to seal the openings of the pipe with both cover and adhesive tape.

● Method of sealing welding

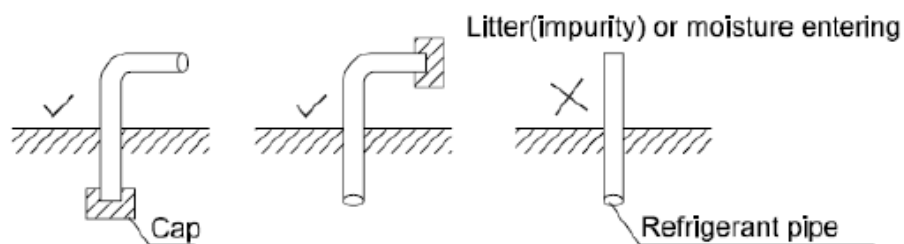


2. Special attention:

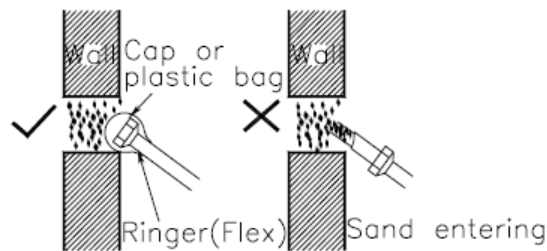
- 1) When putting the copper pipe through the hole in the wall (dirt is easy to enter into the pipe) .



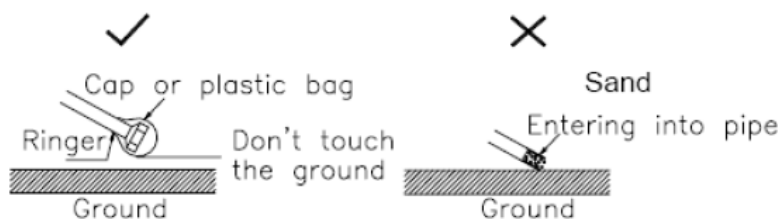
- 2) When the copper pipe goes outside the wall, ensure that no rain water can enter the pipe, particularly when the pipe is placed upright.
- 3) Before completing the pipe connection, seal the openings of the pipe with covers.
- 4) Place the openings of the pipe vertically or horizontally.



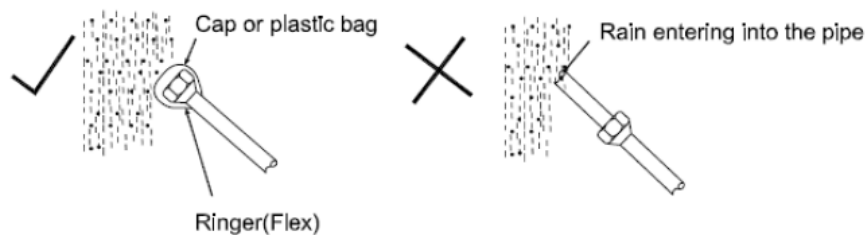
- 5) Before putting the pipe outside the wall, seal the opening of the pipe with a cover.



- 6) Do not place the pipe on the ground directly, or keep it away from ground friction.



- 7) When conduct piping on a raining day, remember to seal the openings of the pipe first.



3.1.3 Processing of copper pipe

3.1.3.1. Pipe cutting

1. Tool

Use a pipe cutter instead of a saw or cutting machine to cut the pipe.

2. Correct operation procedure:

Rotate the pipe evenly and slowly, and apply force to it. Cut the pipe off while ensuring that it does not deform.

3. Risk if a saw or cutting machine is used to cut pipe:

Copper chip will enter the pipe (in this case, it will be very hard to clean up), or which may even enter the compressor or blocking the throttling unit.

3.1.3.2. Rectify opening of copper pipe

1. Purpose

Clear out the burr at the opening of the copper pipe, clean the inside of the pipe, and rectify the opening of the pipe, so as to avoid scratch at the opening to be sealed during flaring.

2. Operation procedure

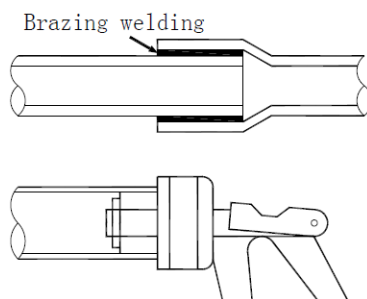
- 1) Use a scraper to remove the inner spurs. When doing so, keep the opening of the pipe downwards to avoid copper chip from entering the pipe.
- 2) After the chamfering is completed, use veiling to remove the copper chip out of the pipe.
- 3) Ensure no scar of produced, so as to avoid the pipe from getting broken during flaring.
- 4) If the pipe end obviously deforms, cut the end off and then cut the pipe again.

3.1.3.3. Pipe expansion

1. Purpose: Expand the opening of the pipe so that another copper pipe can be inserted to replace direct connection and reduce welding spots.

2. Highlight: Ensure that the connection part is smooth and even; after cutting the pipe off, remove the inner spurs.

3. Operation method: Insert the expanding header of the pipe expander into the pipe to expand the pipe. After completing pipe expansion, rotate the copper pipe a small angle to rectify the straight line scratch left by the expanding header.

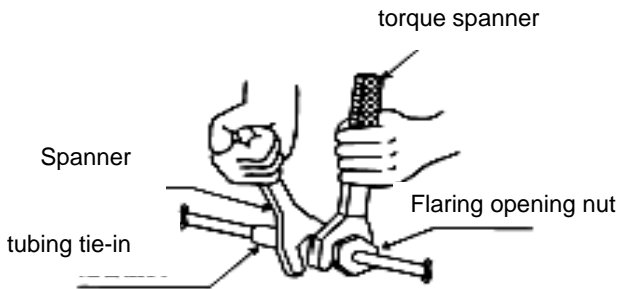


3.1.3.4. Opening bell-mouthed opening

1. Purpose: Flaring Bell-mouthed opening is used for screw thread connection.

2. Highlight:

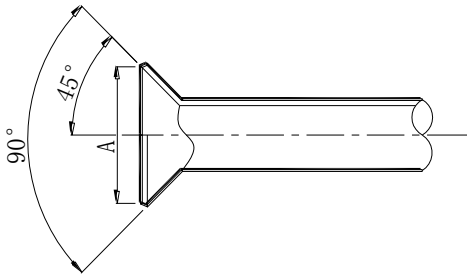
- 1) Before performing the Bell-mouthed opening operation, perform fire annealing for the hard pipe.
- 2) Use pipe cutter to cut pipe to ensure even cross section and avoid refrigerant leakage; do not use a steel saw or metal cutting device to cut pipe, otherwise the cross section will get deformed and the copper chip will enter the pipe.
- 3) Remove burr carefully to avoid scar on the bell-mouthed opening, which may lead to refrigerant leakage.
- 4) When connecting pipes, use two spanners (one torque wrench and one non-adjustable spanner).
- 5) Before conducting opening bell-mouthed, install pipe onto the flaring nut.
- 6) Use proper torque to tighten the flaring nut.

Pipe Diameter	Torque		Legend
	(kgf-cm)	(N-cm)	
1/4" (6.35)	144~176	1420~1720	
3/8" (9.52)	333~407	3270~3990	
1/2" (12.7)	504~616	4950~6030	
5/8" (15.88)	630~770	6180~7540	
3/4" (19.05)	990~1210	9270~11860	

Caution: When you are tightening the flaring nut with a spanner, the tightening torque will be suddenly increased at a certain point. From this point, further tighten the flaring nut to the angles shown below.

Pipe Diameter	Angle of further tightening	Recommended length of tool lever
3/8" (9.52)	60°~90°	About 200mm
1/2" (12.7)	30°~60°	About 250mm
5/8" (15.88)	30°~60°	About 300mm

7) Check whether the surface of the flaring opening is damaged. The size of the flaring opening is as shown below.

Pipe Diameter	R410A	Legend
	Size of Flaring Opening (A)	
1/4" (6.35)	8.7~9.1	
3/8" (9.52)	12.8~13.2	
1/2" (12.7)	16.2~16.6	
5/8" (15.88)	19.3~19.7	
3/4" (19.05)	23.6~24.0	

Cautions:

- Apply some refrigeration oil onto the inner surface and outer surface of the flaring opening, to facilitate the connection or rotation of the flaring nut, ensure close sticking between the sealing surface and the bearing surface, and avoid pipe bending.
- Ensure that the flaring opening is not cracked or deformed, otherwise it cannot be sealed or, after the system runs for some time, refrigerant leakage will occur.

3.1.3.5. Pipe bending

1. Method

- Manual bending: Suitable for thin copper pipes ($\phi 6.35$ – $\phi 12.7$).
- Mechanical bending: Suitable in a wide range of copper pipes ($\phi 6.35$ – $\phi 67$). Spring bender, manual bender or electric bender is used.

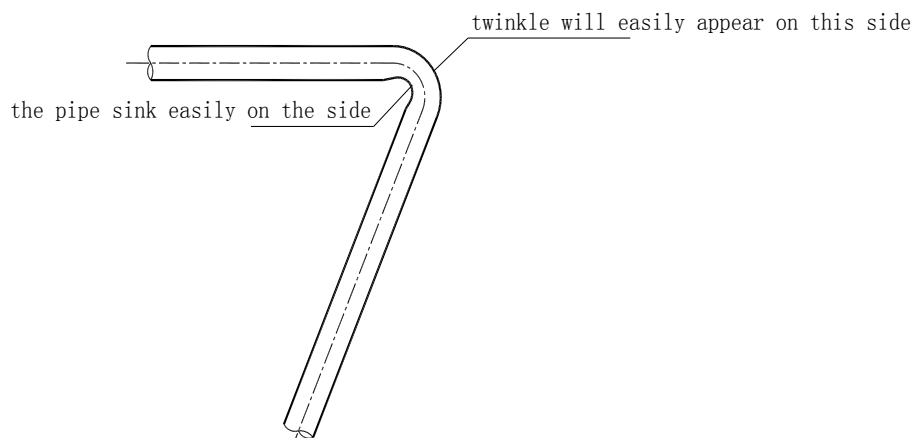
Purpose: Reduce welding joints and required elbows, and improve engineering quality; In order to save material, no joint is needed.

2. Caution

- When bending a copper pipe, ensure that there is no wrinkle or deformation on the inner side of the pipe.
- When using a spring bender, ensure that the bender is clean before inserting it in the copper pipe.
- When using a spring bender, ensure that the bending angle does not exceed 90°, otherwise wrinkle will

appear on the inner side of the pipe, and the pipe may easily get broken.

4) Ensure that the pipe does not sink during the bending process; ensure that the cross section of the bending pipe is larger than 2/3 of the original area, otherwise it cannot be used.



3.1.4 Brazing welding operation

3.1.4.1. Selecting refrigerant pipe

1. All pipe use shall comply with national or local standards (for example, pipe diameter, material, thickness, etc.)
2. Specification: Seamless phosphorus to oxygenate copper pipe
3. Try best to use straight pipe or coil and avoid too much brazing welding.

Note: Select the pipes according to the pipe diameters shown below (O—coil, 1/2H—straight pipe)

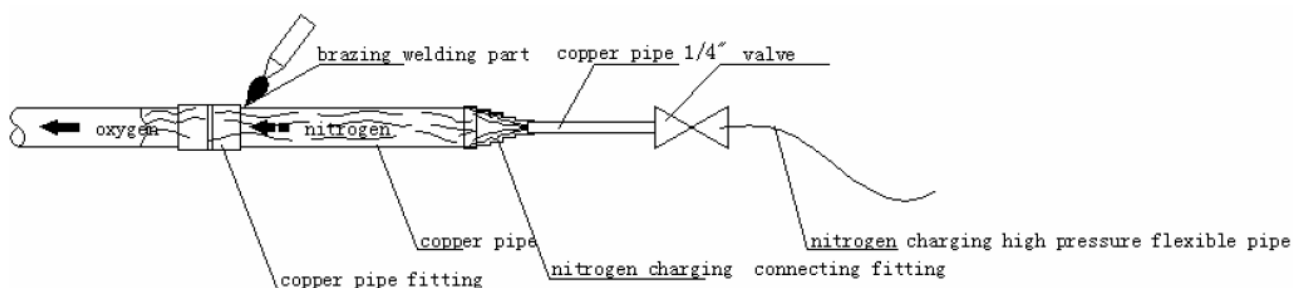
Outer Diameter	Material	Minimum Thickness	Outer Diameter	Material	Minimum Thickness	Outer Diameter	Material	Minimum Thickness
Φ6.35	O	0.8	Φ19.0	O	1.0	Φ38.0	1/2H	1.5
Φ9.52	O	0.8	Φ22.0	1/2H	1.2	Φ45.0	1/2H	1.5
Φ12.7	O	0.8	Φ25.0	1/2H	1.2	Φ54.0	1/2H	1.8
Φ15.9	O	1.0	Φ28.6	1/2H	1.3	Φ67.0	1/2H	1.8

3.1.4.2. Nitrogen filling for protecting copper pipe during brazing welding

1. Purpose: Avoid oxide scale from appearing on the inner wall of the copper pipe in the high temp.
2. Risks of non-protective welding:

If no sufficient nitrogen is charged into the refrigerant pipe being welded, oxides will be generated on the inner wall of the copper pipe. These oxides will block the refrigerant system, which will lead to all kinds of malfunctions such as burn-out the compressor, poor cooling efficiency.

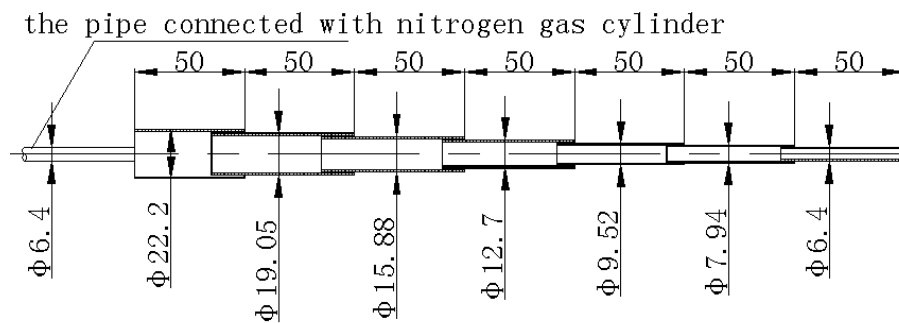
To avoid these problems, charge nitrogen continuously into the refrigerant pipe during the brazing welding, and ensure that the nitrogen passes through the operating point until the welding is completed and the copper pipe cools down completely. The schematic diagram for nitrogen charging is shown below.



3. Making Nitrogen-Charging Pipe Joint

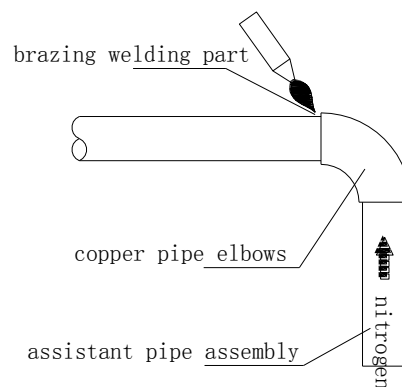
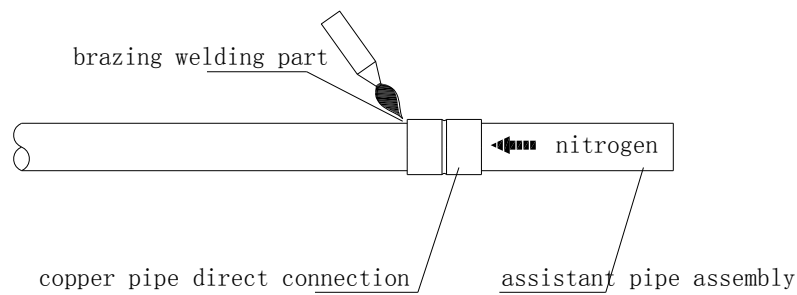
When welding the pipe joint, connect the nitrogen-charging joint to the pipe fittings to be welded.

The nitrogen-charging joint is shown below:

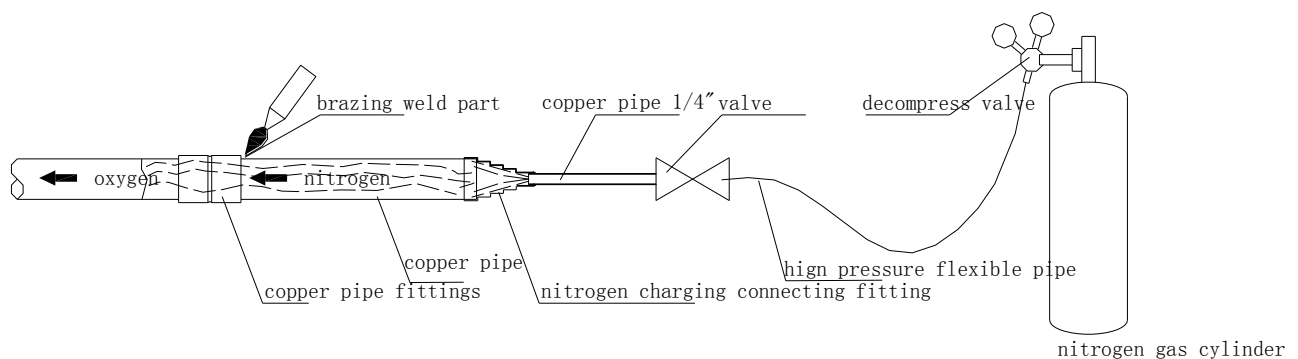


4. Cautions for Welding Pipe Fittings

- 1) Adopt transition pipe.
- 2) Charge nitrogen from the side of the short pipe, because short distance may result in perfectible nitrogen replacement effect.

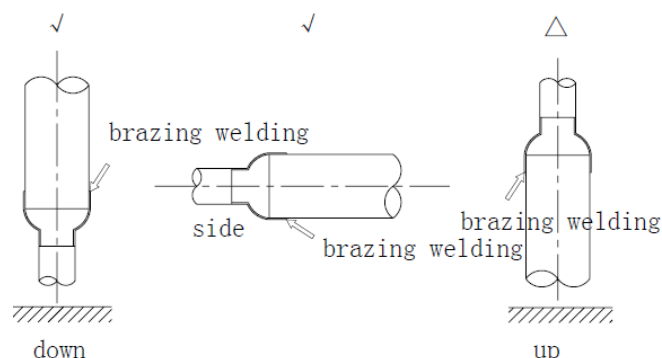


5. Standard operation of Brazing Welding



6. Highlight

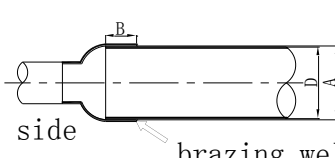
- 1) Control the nitrogen pressure to be about 0.2-0.3kgf/cm² during the welding.
- 2) Ensure the gas is nitrogen; oxygen will easily leads explosion, so it is forbidden.
- 3) Use pressure reducing valve, and control the pressure of the charged nitrogen to be about 0.2kg/ cm².
- 4) Select a proper position for charging nitrogen.
- 5) Ensure that the nitrogen passes through the welding spots.
- 6) If the pipeline between the position for charging nitrogen and the welding spot is rather long, ensure that the nitrogen is charged for sufficient time so as to discharge all the air from the welding spot.
- 7) After completing the welding, charge the nitrogen continuously until the pipe cools down completely.
- 8) Try best to conduct welding downwards or horizontally and avoid face-down welding.



7. Cautions

- 1) Take fire-prevention measures when conducting welding (ensure that a fire extinguisher is available beside the operating position).
- 2) Avoid getting burnt.
- 3) Pay attention to the fit gap of the position where the pipe is inserted.

Note: The follow table shows the relation between the minimum embedded depth and gap at the copper pipe joint.

Type	Outer Diameter of Pipe (D) (mm)+	Minimum Inlaid Depth (B) (mm)	Gap A—D (mm)
	5<D<8	6	0.05—0.21
	8<D<12	7	
	11<D<16	8	0.05—0.27
	16<D<25	10	
	25<D<35	12	0.05—0.35
	35<D<45	14	

3.1.5 Pipe cleaning out

3.1.5.1. Flushing copper pipe

1. Function: use pressure gas to flush pipeline (raw material or welded assembly) for eliminating dust, trash and moisture. Solid impurity is hard to be washed out, so special attention shall be drawn to the protection of copper pipeline during construction.

2. Purpose

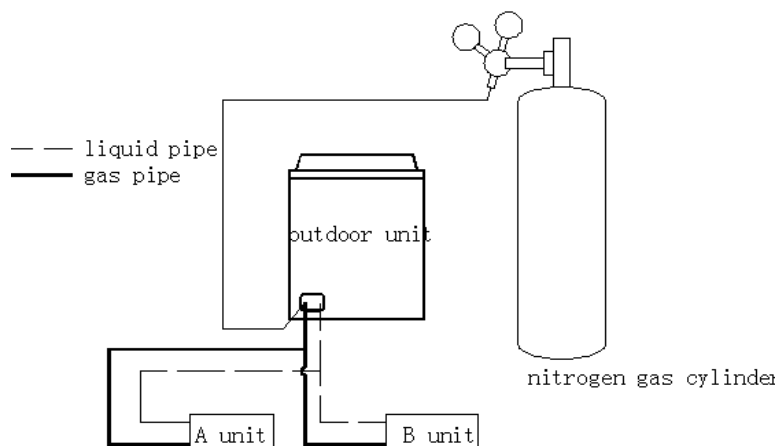
- 1) Eliminate oxide powder or part oxide layer in copper pipe.
- 2) Help to clear out dirt and humidity in pipe.

3. Risk in case of no flushing:

If the remaining solid impurity and moisture in pipeline could not be eliminated effectively, serious malfunctions shall happen, such as ice blockage, dirt blockage and compressor being jammed.

3.1.5.2. Procedure of flushing

1. Mounting pressure adjusting valve on nitrogen gas cylinder. The applied gas must be nitrogen. If adopting polytetrafluoro ethylene or carbon dioxide, there is a risk of condensation. If using oxygen, there is a risk of explosion.
2. Making use of inflation tube to connect outlet of pressure adjusting valve and inlet at liquid pipe side of outdoor unit.

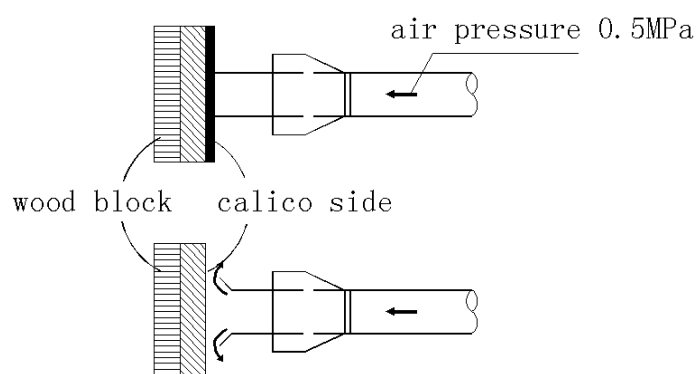


3. Use blind plug to block all connectors of liquid side copper line (including unit B) soundly, excluding indoor unit A.
4. Turn on nitrogen gas cylinder valve, and then pressurize to 5kgf/cm² gradually through adjusting valve.
5. Check whether nitrogen has passed through the liquid pipe at the side of indoor unit A. Connector at the side of indoor unit body has been covered by tape to prevent the entering of dirt.

3.1.5.3. Detailed steps for flushing

1. Hold proper blockage material (such as block bag and white cotton) to push against the main pipe opening at the gas side of indoor unit.
2. When pressure increases and hands could not push against the opening, suddenly release pipe opening (flushing for first time).

Repeat above step1 and step 2 to re-flush dirt (flushing for multi-times)

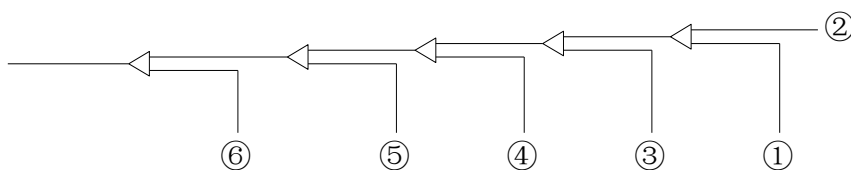


3. During flushing, place a piece of white cotton at the pipe opening for checking, and you shall find some humidity occasionally.

Way of thoroughly drying pipeline is as follows:

- 1) Making use of nitrogen gas to flush the inner part of pipe until no dirt and humidity.
- 2) Carry out vacuum drying operation (see vacuum drying of MDV refrigerant piping in detail).
- 3) Shut down nitrogen main valve.

- 4) Repeat above operations to the connected copper pipe of all indoor units.
- 5) Sequence of flushing: when pipeline has been connected to system, sequence of flushing is from far to near, that is, in light of principal unit, flushing from the farthest pipe opening to principal unit in turn (i.e. 1)-2)-3)-4)-5)-6)).



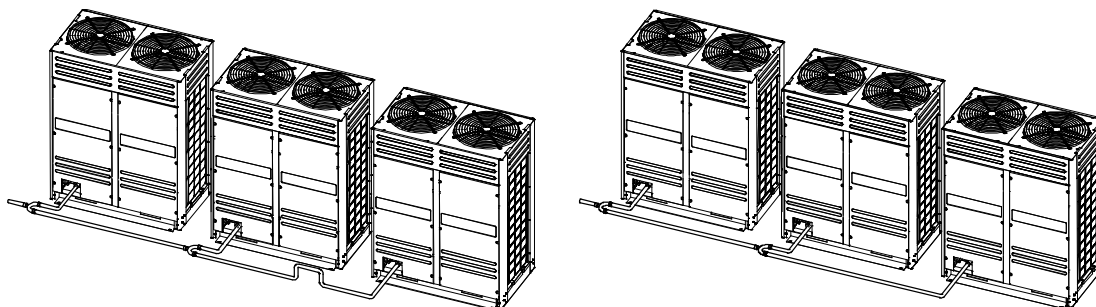
Caution: When flushing one pipe opening, block all pipe openings which are connected to this opening.

6) After finishing flushing, seal soundly all openings linked with atmosphere to prevent the entering of dust, trash and moisture.

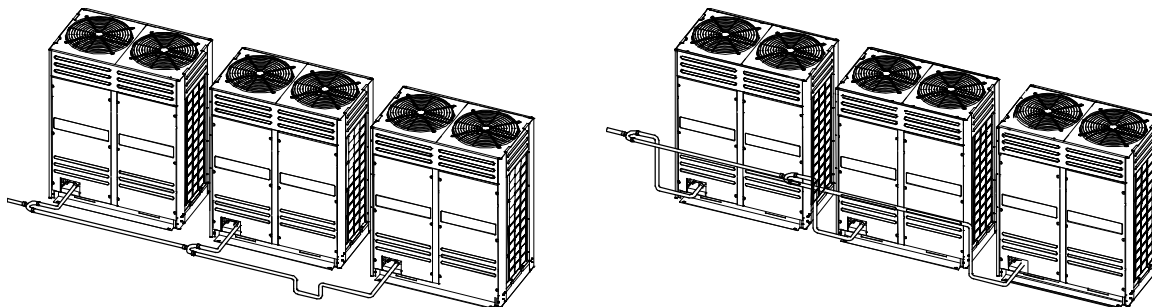
3.1.6 Installation highlight of pipe system

- 1) Pipe between outdoor units must install horizontally, the mid-connecting pipe between those pipes aren't allowed downward drop.
- 2) All pipes between outdoor units cannot be higher than the outdoor units' outlet.

The right installation type:



The wrong installation type:



3.2. Air Tight Test

3.2.1 Purpose and operation procedure of air tightness test

3.2.1.1. Purpose

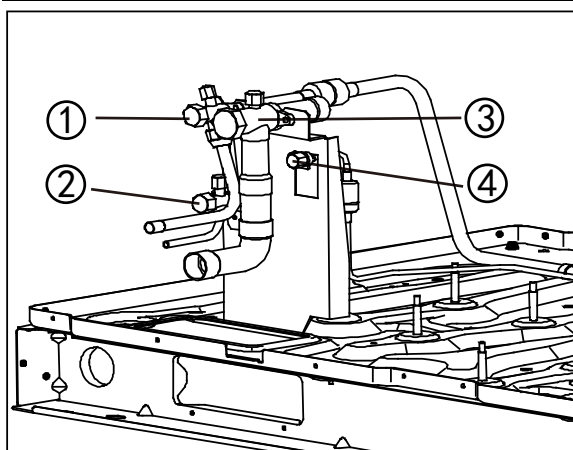
Search leak source, make sure there is no leakage in system to prevent system fault due to leakage of refrigerant.

3.2.1.2. Operation tips

Subsection detection, overall pressure-keeping, grading pressurization.

3.2.1.3. Operation procedure

1. After piping of indoor unit has been connected, weld port of high-pressure side piping.
2. Weld low-pressure side piping with connector for pressure gauge together.
3. Charge nitrogen slowly into pressure gauge connector to conduct air tightness test.



①	Liquid side stop valve
②	Oil balancer
③	Gas side stop valve
④	Gauge point(Use for detecting pressure and refrigerant)

3.2.2 Operation of air tightness test

3.2.2.1. Operation procedure

1. When conducting air tightness test, make sure that gas pipe and liquid pipe are kept in full-shut status; otherwise, nitrogen might enter the circulation system of outdoor unit. Both gas valve and liquid valve need to be strengthened before pressurization d.
2. Each refrigerant system shall be slowly pressurized from the two sides of gas pipe and liquid pipe.
3. Make use of dry nitrogen as medium to conduct air tightness test. Phase-in control diagram of pressurization is as follows:

No.	Phase (phase-in pressurization)	Criteria
1	Phase 1: appear large leakage after over three minutes of pressurization with 3.0kgf/cm ² .	No pressure drop after modification
2	Phase 2: appear major leakage after over three minutes of pressurization with 15. 0kgf/cm ² .	
3	Phase 3: appear small leakage after over 24 hours of pressurization with R410A: 40.0kgf/cm ² .	

3.2.2.2. Pressure observation

1. Pressurize to regulated value and maintain 24 hours. When modifying pressure according to variation of temperature, it is qualified if pressure drop does not happen. If pressure falls, find out the leak source and modify it.

2. Modification method

When ambient temperature difference is $\pm 1^{\circ}\text{C}$, the pressure difference shall be $\pm 0.1 \text{ kgf/cm}^2$.

Modification formula: Real value = pressure of pressurization + (temperature of pressurization – temperature during observation) $\times 0.1 \text{ kgf/cm}^2$

You can find out whether the pressure drops or not by comparing the modification value with pressurization value.

3. General ways for searching leak source

Conduct detection through three phases; find out leak source when pressure drop happens.

- 1) Audition detection-----hear large leakage sound
- 2) Hand-touching detection-----place hand at the joint of pipeline to feel whether there is leakage
- 3) Soap water detection-----bubbles shall burst out from leak source.
- 4) Detection by use of halogen leak detector

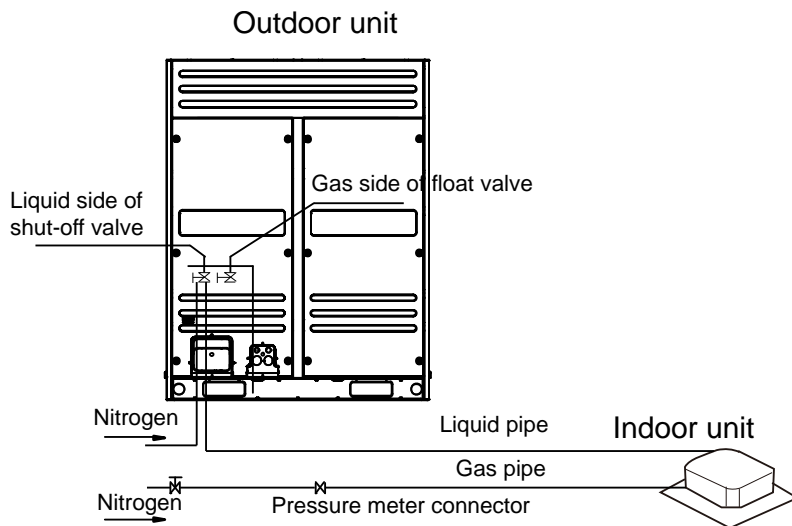
Using halogen leak detector when finding out pressure drop but not finding the leak source.

a. Keep nitrogen at 3.0kgf/cm².

b. Supplement refrigerant to 5.0kgf/cm².

c. Use halogen leak detector, methane leak detector and electric leak detector for detection.

d. If the leak source still could not be found, continuously pressurize to 40.0kgf/cm² (R410A) and then detect again.



4. Caution

- 1) The air tightness test is conducted by pressurize nitrogen (R410A system: 40kgf/cm^2).
- 2) It is not allowed to adopt oxide, flammable gas and toxic gas to conduct air tightness test.
- 3) Before pressure-keeping reading, let it rest for several minutes till pressure is stable, to record temperature, pressure value for future modification.
- 4) After pressure-keeping is over, release system pressure to $5\sim 8\text{kgf/cm}^2$ and then conduct pressure-keeping and storage.
- 5) If pipeline is too long, conduct phase-in detection.
 - a. Inner side of pipeline
 - b. Inner side of pipeline + upright
 - c. Inner side of pipeline + upright + outer side of pipeline

3.3. Vacuum Drying

3.3.1 Purpose and highlights of vacuum drying

3.3.1.1. Purpose of vacuum drying

1. Dehumidify the system to prevent ice-blockage and copperizing. Ice-blockage shall cause abnormal operation, while copperizing shall damage compressor.
2. Eliminating the non-condensable gas of system to prevent oxidizing components, system pressure fluctuation, and bad heat exchanging during the system operation.
3. Detect leak source from reverse rotate.

3.3.1.2. Selection of vacuum pump

1. The limit of vacuum degree is below -756mmHg .
2. The discharge of vacuum pump is over 4L/s .
3. The precision of vacuum pump is over 0.02mmHg .

Highlights of R410A system:

After the vacuum process of R410A refrigerant circulation is over, vacuum pump stops running and the lubricant in vacuum pump shall flow back to air conditioning system, for the inner of pump soft pipe is in vacuum status. In addition, same situation shall happen if vacuum pump suddenly stops during operation. At this moment, different oils will mix, which induce the refrigerant circulating system to malfunction, so it is recommended to use one-way valve to prevent reverse flow of oil in vacuum pump.

3.3.1.3. Vacuum drying for pipe

Vacuum drying: Use vacuum pump to make the moisture (liquid) in pipeline change into steam, which will eliminate the moist of the pipeline and keep drying of pipe inner. Under atmospheric pressure, water's boiling point (steam temperature) is 100°C , while its boiling point will decline when using vacuum

pump reduce the pipeline pressure to vacuum. When the boiling point declines under outdoor temperature, moisture in pipe shall be evaporated.

Boiling Point of Water (°C)	Air Pressure (mmHg)	Vacuum Degree (mmHg)	Boiling Point of Water (°C)	Air Pressure (mmHg)	Vacuum Degree (mmHg)
40	55	-705	17.8	15	-745
30	36	-724	15	13	-747
26.7	25	-735	11.7	10	-750
24.4	23	-737	7.2	8	-752
22.2	20	-740	0	5	-755
20.6	18	-742			

3.3.2 Operation procedure for vacuum drying

3.3.2.1. Methods of vacuum drying

By different construction environment, there are two kinds of vacuum drying ways: ordinary vacuum drying and special vacuum drying.

3.3.2.1.1. Ordinary vacuum drying

- 1) Firstly, connect the pressure gauge to the infusing mouth of gas pipe and liquid pipe, keep vacuum pump running for above 2 hours, and it is quality that vacuum degree of vacuum pump is below -755mmHg.
- 2) If the vacuum degree of vacuum pump could not be below -755mmHg after 2 hours of drying, system will continue drying for one hour.
- 3) If the vacuum degree of vacuum pump could not be below -755mmHg after 3 hours of drying, please check the system leakage source.
- 4) Vacuum placement test: when the vacuum degree reaches -755mmH, keep rest for 1 hour. If the indicator of vacuum gauge does not go up, it is qualified. If going up, it indicates that there is moisture and leak source.
- 5) Vacuum drying shall be conduct from liquid pipe and gas pipe simultaneously. There are a lot of functional parts like valves, which could shut down the gas flow midway.

3.3.2.1.2. Special vacuum drying

This kind of vacuum drying method shall be adopted when:

- 1) Finding moisture during flushing refrigerant pipe.
- 2) Conducting construction on rainy day, because rain water might penetrated into pipeline.
- 3) Construction period is long, and rain water might penetrated into pipeline.
- 4) Rain water might penetrate into pipeline during construction.

Procedures of special vacuum drying are as follows:

- a. The first vacuum drying 2 hours.
- b. The second vacuum damage, filling nitrogen to 0.5Kgf/cm².

Because nitrogen is dry gas, vacuum damage could achieve the effect of vacuum drying, but this method could not achieve drying thoroughly when there is too much moisture. Therefore, special attention shall be drawn to prevent the entering of water and the formation of condensate water.

- c. The second vacuum drying 1 hour.

It is qualified when vacuum degree is under -755mmHg; if the vacuum degree is still above -755mmHg within 2 hours drying, please repeat the procedures of "vacuum damage---vacuum drying".

- d. Vacuum placement test: when the vacuum degree reaches -755mmH, keep rest for 1 hour. If the indicator of vacuum gauge does not go up, it is qualified. If going up, it indicates that there is moisture and leak source.

3.4. Recharge of Refrigerant

3.4.1 Operation procedure for recharging refrigerant

3.4.1.1. Operation procedure

Calculate the required refrigerant volume by the length of liquid pipe → recharging refrigerant.

※The refrigerant volume from factory does not include the recharged amount of the pipeline extending.

3.4.1.2. Detailed steps for recharging refrigerant

1. Make sure vacuum drying is qualified before recharging refrigerant.
2. Calculate the required refrigerant volume by the dia. and the length of liquid pipe.
3. Use electronic scale or fluid infusion apparatus to weight the recharged refrigerant volume.
4. Use soft pipe to connect refrigerant cylinder, pressure gauge, and examine valve of outdoor unit. And recharge with liquid mode. Before recharging, eliminate the air in the soft pipe and pressure gauge's pipe.
5. After finishing the recharging, by the gas leak detector or soap water, to detect whether there is refrigerant leakage in expansion part of indoor and outdoor units.
6. Write the recharged refrigerant volume in the indicating plate of outdoor unit.

Caution

- 1) The recharged refrigerant volume must be calculated according to the formula in the technical reference of outdoor unit. It isn't allowed to calculate by running current, pressure and temperature. Because current and pressure is changeable due to the difference of temperature and length of pipeline.
- 2) In the cold ambient, use warm water and hot wind to warm up refrigerant storage cylinder, and don't allow heating up directly by flame.

3.4.1.3. Recharging of R410A refrigerant

If R410A refrigerant is adopted, the tool shall be different. Confirm the following items before Recharged:

- 1) The different vacuum pump with one-way valve.
- 2) The different pressure gauge: the nut of connector and pressure scale are different.
- 3) The different recharging soft pipe and connector.
- 4) The charging method is different. Recharge into the outdoor unit with liquid phase.
- 5) The different leak detector.

3.4.2 Calculating the recharged refrigerant volume

Calculate the recharged refrigerant volume by the length and dia. of liquid pipe of indoor units

R410A			
Diameter of Liquid Pipe	Equivalent Refrigerant for Pipe Length of 1m (kg/m)	Diameter of Liquid Pipe	Equivalent Refrigerant for Pipe Length of 1m (kg/m)
Φ6. 4	0.023	Φ19. 1	0.270
Φ9. 5	0.060	Φ22. 2	0.380
Φ12. 7	0.120	Φ25. 4	0.520
Φ15. 9	0.170	Φ28. 6	0.680

Calculating formula (R410A):

The recharged volume: $R \text{ (Kg)} = (L1 \times 0.023 \text{ kg/m}) + (L2 \times 0.060 \text{ kg/m}) + (L3 \times 0.120 \text{ kg/m}) + (L4 \times 0.180 \text{ kg/m}) + (L5 \times 0.270 \text{ kg/m}) + (L6 \times 0.380 \text{ kg/m}) + (L7 \times 0.520 \text{ kg/m}) + (L8 \times 0.680 \text{ kg/m})$

L1: Actual total length of Φ6.4 liquid pipe (m); L2: Actual total length of Φ9.5 liquid pipe (m);

L3: Actual total length of Φ12.7 liquid pipe (m); L4: Actual total length of Φ15.9 liquid pipe (m);

L5: Actual total length of Φ19.1 liquid pipe (m); L6: Actual total length of Φ22.2 liquid pipe (m);

L7: Actual total length of Φ25.4 liquid pipe (m); L8: Actual total length of Φ28.6 liquid pipe (m)

4. Drainage Pipe Engineering

4.1 Installation Highlights of Drainage Pipe

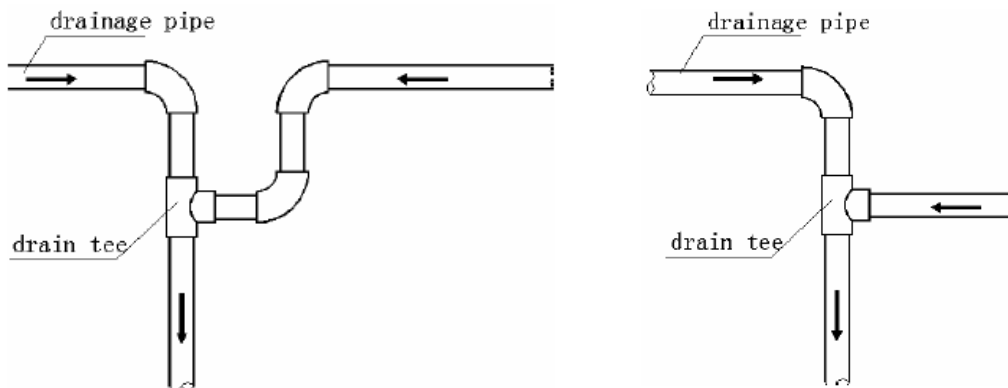
4.1.1. Installation principle of drainage pipe:

1) Slope; 2) reasonable pipe diameter; 3) nearby discharge

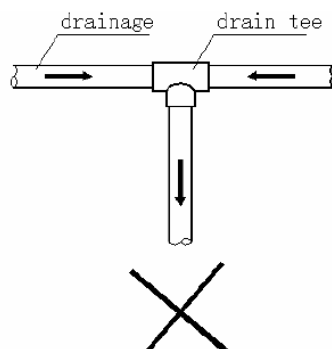
4.1.2. Installation highlights of drainage pipe:

1. Before installing condensate water pipeline, determine its route and elevation to avoid intersection with other pipelines and ensure slope is smooth and straight.
2. Make sure that the two horizontal fluid pipes shall avoid encountering, and preventing flow backwards and drainage difficulty.

a. Correct connection:



b. Incorrect connection:



Advantages of correct connection:

1. Do not cause flow backwards of one pipe.
2. The slope of two pipes can be regulated separately.

Disadvantages of incorrect connection:

1. Interfere drainage.
2. The side of branch pipe with large quantity of fluid volume will flow to the side with small quantity, thus leading to the water backwards of branch pipe with small quantity.

3. Suspender gap:

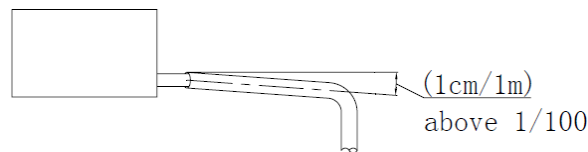
In general, the horizontal gap is 0.8m-1m and the vertical gap is 1.5m-2.0m. Each vertical pipe shall be equipped with not less than two suspenders. Overlarge suspender gap for horizontal pipe shall create bending, thus leading to air resistance.

4. The highest point of drainage pipe shall be designed with air hole to ensure that condensate water could be discharged smoothly. The outlet air hole shall face down to prevent dirt entering pipe.
5. After finishing connection, conduct water passing test and overflowing water test to pipelines to check the smoothness of drainage and leakage of pipeline system.
6. Use specific glue to adhesive the seam of thermal insulation materials, and then bind with rubber or

plastics adhesive tape. The width of the adhesive tape shall not be less than 50mm to ensure fastness and prevent condensation.

7. The drainage pipe of air conditioner shall be installed separately with other waste pipe, rainwater pipe and other drainage pipe in building.

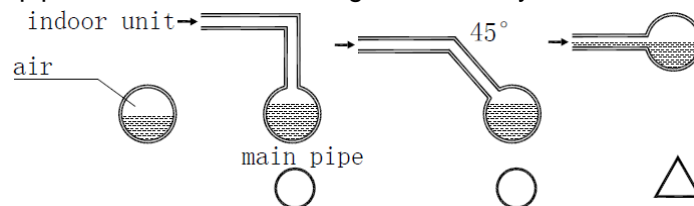
8. The slope of drainage pipe shall be kept above 1/100.



9. In case 1/100 slope can not need, consider to use larger-sized pipe and use its dia. to create slope.

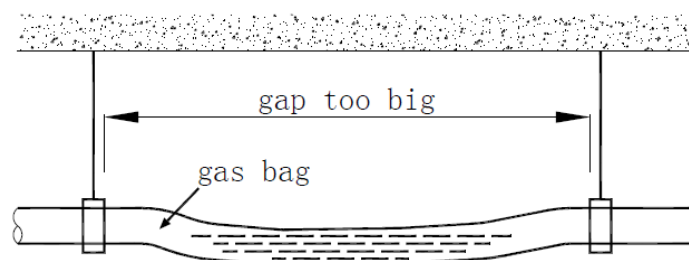
10. Conflux towards horizontal pipe shall come from upside as much as possible. If it comes from transverse route, reflux is easy to be created.

11. The end of drainage pipe shall not contact with ground directly.



4.1.3. Caution

1. The drainage pipe diameter shall meet the draining requirement of indoor unit.
 2. The outlet air vent cannot be installed nearby the lifting pump of the indoor unit.
 3. Check whether condensate water pump can be started up and shut down normally by infusing water into the water-containing plate of indoor unit and powering on.
 4. All joints shall be firm (particularly PVC pipe).
 5. The drainage pipe is not allowed to turn to adverse slope, horizontal, and bending.
 6. Dimension of drainage pipe shall be not less than the connecting mouth size of drain piping to indoor unit.
 7. Work out thermal insulation of drainage pipe, otherwise it is easy to produce condensation. Thermal insulation processing shall be continued to the connecting part of indoor unit.
 8. Indoor units with different draining pattern shall not share the same concentrated drainage pipe.
 9. Discharge of condensate water cannot influence normal life and working of other people.
 10. As for long drainage pipe, hanging bolt shall be used to ensure 1/100 slope without bending PVC pipe.
- ※ The support gap of horizontal pipe is 0.8-1.0mm. If the gap is too large, it shall produce bending and air resistance, while air resistance could seriously influence smoothness of water flow to cause abnormal water level. As shown in following figure:



4.2 Water Storing Elbow of Drainage Pipe

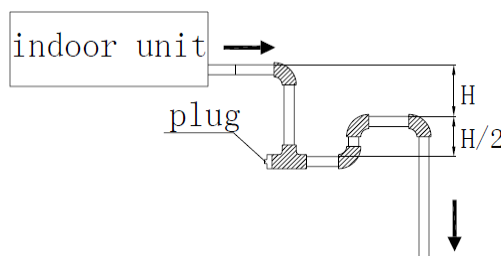
4.2.1. To indoor unit with large negative pressure at the outlet of water-containing plate, the drainage pipe must be equipped with water storing elbow.

Function of water storing elbow:

When indoor unit is in motion, prevent generating negative pressure to cause drainage difficulty or blow water out of the air outlet.

Installation of water storing elbow:

1. Install water storing elbow as shown in following figure: H shall be above 50mm.
2. Install one water storing elbow for each unit.
3. When installation, consider it shall be convenient in future clean.

**4.3 Concentrated Drainage Pipe****4.3.1. Pipeline diameter of concentrated drainage pipe**

Select drainage pipe diameter according to indoor unit's combined flow volume.

E.g. If one 1HP unit with 2L/h discharging condensate water, the calculation of the combined flow volume of three 2HP units and two 1.5HP units is: $2\text{HP} \times 2\text{L/h} \times 3 + 1.5\text{HP} \times 2\text{L/h} \times 2 = 18\text{L}$

4.3.2. Relation between horizontal pipeline diameter and permitted displacement of condensate water

PVC piping	Inner diameter of piping (reference value: mm)	Inner diameter of piping (mm)	Permitted displacement(l/h)		Remark
			Slope 1:50	Slope 1:100	
PVC25	19	20	39	27	(Reference value) could not used for confluence pipe
PVC32	27	25	70	50	
PVC40	34	31	125	88	Could be used for confluence pipe
PVC50	44	40	247	175	
PVC63	56	51	473	334	

Attention: through converge point need use PVC40 or larger pipe.

4.3.3. Relation between vertical pipeline diameter and displacement of condensate water

PVC piping	Inner diameter of piping (reference value: mm)	Inner diameter of piping (mm)	Permitted displacement(l/h)	Remark
PVC25	19	20	220	(Reference value) could not used for confluence pipe
PVC32	27	25	410	
PVC40	34	31	730	Could be used for confluence pipe
PVC50	44	40	1440	
PVC63	56	51	2760	
PVC75	66	67	5710	
PVC90	79	77	8280	

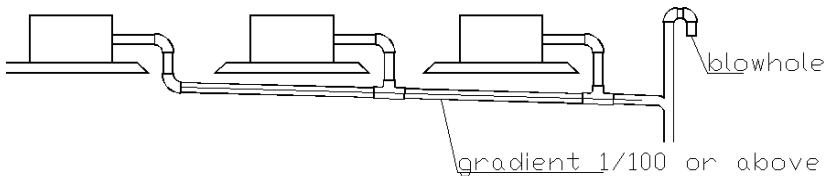
Attention: through converge point need use PVC40 or larger pipe.

4.3.4. Operation process of concentrated drainage

Install indoor unit → connect drainage pipe → water passing test and overflowing water test → thermal insulation of drainage pipe

Caution:

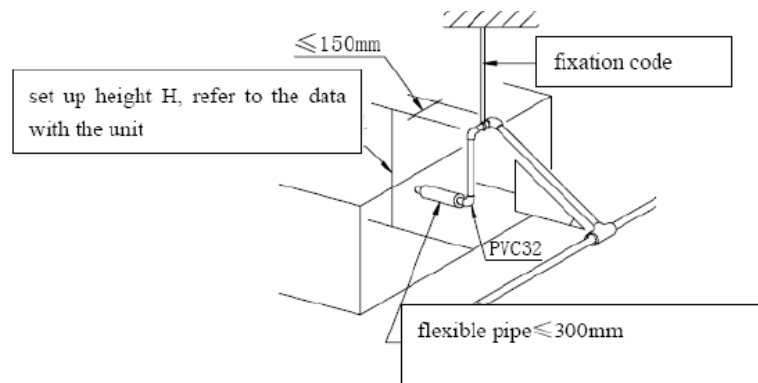
- 1) Increase drainage point as much as possible and reduce quantity of connected indoor units, to ensure horizontal main drainage pipe not be too long.
- 2) Units with drainage pump and natural drainage shall converge to different drainage system separately.
- 3) Add two elbows at air outlet, and make sure its mouth faces down to prevent dirt and so on dropping into pipe to create blockage.



4.4 Lifting of Drainage Pipe (for the Unit with Lift Pump)

4.4.1. Installation of lift pipe

1. When connecting drainage pipe with indoor unit, use pipe clamp shipped with unit to fix. Glue splicing is not permitted for ensuring convenience in repairing.
2. To ensure 1/100 slope, total lift height of drainage pipe (H) shall depend on indoor unit's pump, and do not set vent pipe on the lifting pipe section. After lifting vertically, immediately place down inclined, otherwise it will cause error operation of switch at water pump. The connecting method is shown as follows:



Note: Air outlet could not be installed on the lifting part; otherwise water shall be discharged to ceiling or could not be discharged.

4.5 Overflowing Water Test and Water Passing Test

4.5.1. Overflowing water test

After finishing the construction of drainage pipe system, fill the pipe with water and keep it for 24 hours to check whether there is leakage at joint section.

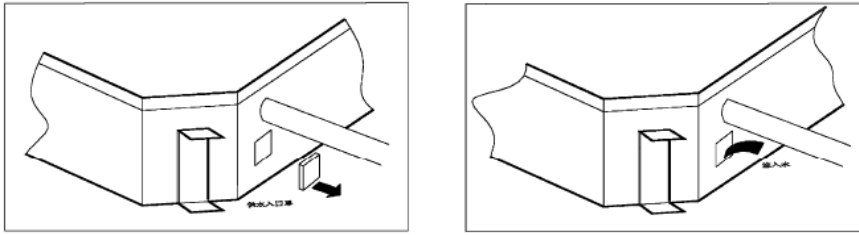
4.5.2. Water passing test

1. Natural drainage mode

Infuse water-containing plate with above 600ml water through check port slowly, and observe transparent hard pipe at drainage outlet to confirm whether it can discharge water.

2. Pump drainage mode

- 1) Remove plug of water level switch, remove water-finding cover and slowly infuse water-containing plate with about 2000ml water through water-finding port to prevent touching the motor of drainage pump.



2) Power on and let the air conditioner operate for cooling. Check operation status of drainage pump, and then turn on water level switch, check operation sound of pump and observe transparent hard pipe at drainage outlet to confirm whether it can discharge water. (In light of the length of drainage pipe, water shall be discharged after delaying about 1 minute)

3) Stop the operation of air conditioner, turn down power supply and put water-finding cover to the original place.

a. After stopping the operation of air conditioner, check whether there is something abnormal 3 minutes later. If drainage pipe have not been distributed properly, over back-flow water shall cause the flashing of alarm indicator at remote-controlled receiving board and even water shall run over the water-containing plate.

b. Continuously add water until reaching alarm water level, check whether the drainage pump could discharge water at once. If water level does not decline under warning water level 3 minutes later, it shall cause shutdown of unit. When this situation happens, normal startup shall be carried out by turning down power supply and eliminating accumulated water.

Note: Drain plug at the main water-containing plate is used for eliminating accumulated water in water-containing plate when maintaining air conditioner fault. During normal operation, the plug shall be filled in to prevent leakage.

5. Duct Engineering

5.1. Fabrication of Duct

1. The material, specification, performance and thickness of metal duct should be in accordance with the relevant regulations of present National Products Standard. The thickness of steel sheet or galvanized steel sheet should not be less than the regulation in table below:

Thickness of steel sheet duct (mm)

Diameter (D) or edge length (b) of duct	Circular duct	Rectangle duct	
		Middle/low pressure system	High pressure system
$D(b) \leq 320$	0.5	0.5	0.75
$320 < D(b) \leq 450$	0.6	0.6	0.75
$450 < D(b) \leq 630$	0.75	0.6	0.75
$630 < D(b) \leq 1000$	0.75	0.75	1.0
$1000 < D(b) \leq 1250$	1.0	1.0	1.0

2. The material, specification, performance and thickness of non-metal duct should be in compliance with design and regulations of present National Products Standard.

3. The body, frame, fixing material and sealed cushion of fire-proof air duct should be made of non-combustible materials. Its fire resistance rating should be in accordance with the design requirement.

4. The sheathing of composite duct should be made of non-combustible materials. Inner insulation material should be no burning or burning retardant with rating B1, and no harm to people's body.

5. The permitting deviation to outer diameter or long edge of duct: when no more than 300mm, it is 2mm; when more than 300mm, it is 3mm. The permitting deviation of pipe end flatness is 2mm.

Discrepancy between two diagonal lines of rectangle duct shall not be more than 3mm. Discrepancy between two diameters of any cross-cut circular flange shall not be more than 2mm.

5.2. Connection of Duct

1. Connection of metal duct

1) The seam of duct board splice should be stagger and cross-seam is not allowed.

2) Specification of metal duct flange shall not be less than the data as shown in table below.

Specification to flange and bolt of circular metal duct (mm)

Diameter of duct (D)	Specification of flange		Specification of bolt
	Flat steel	Angle steel	
$D \leq 140$	20×4	—	M6
$140 < D \leq 280$	25×4	—	
$280 < D \leq 630$	—	25×3	
$630 < D \leq 1250$	—	30×4	M8
$1250 < D \leq 2000$	—	40×4	

Specification to flange and bolt of rectangle metal duct (mm)

Dimension of long edge of duct (b)	Specification of flange (angle steel)	Specification of bolt
$B \leq 630$	25×3	M6
$630 < b \leq 1500$	30×3	M8
	40×4	
$2500 < b \leq 4000$	50×5	M10

3) Diameter of bolt and rivet to duct flange for middle/low pressure system should be no more than 150mm.

As for duct of high pressure system, it should be no more than 100mm.

4) Four angles of rectangle duct flange should be designed with screw hole.

5) When improving the strength of duct flange position by adopting reinforcement method, the applied condition corresponding to flange specification could be extended.

2. Connection of nonmetallic duct

Specification of flange should be in accordance with standard, gap of bolt hole should be no more than 120mm. Four angles of rectangle duct flange should be designed with screw hole.

3. Strengthening of metal duct

When edge length of rectangle duct is more than 630mm, edge length of insulation duct is more than 800mm and length of pipe section is more than 1250mm, or single-edge level area of low pressure duct is more than 1.2 square meters and single-edge level area of high/middle pressure duct is more than 1.0 square meter, strengthening measures should be conducted.

4. Strengthening of nonmetallic duct

When diameter or edge length of HPVC duct is more than 500mm, the joint section of duct and flange should be equipped with strengthening board and the gap should not be more than 450mm.

5.3. Connecting Highlights of Duct

1. Supporting, hanging and mounting bracket should be made of angle steel. Position of expansion bolt should be correct, firm and reliable. The buried part could not be painted and oil pollution should be eliminated. Gap should be in accordance with regulation below:

1) If duct is installed horizontally, gap should be no more than 4mm when diameter or edge length is less than or equal to 400mm, while the gap should be no more than 3mm when diameter or edge length is more than 400mm.

2) If duct is installed vertically, gap should be no more than 4mm and make sure there is at least 2 fixed points on single straight pipe.

2. Supporting, hanging and mounting bracket could not be installed at air opening, valve, checking door and automatically controlled device, and distance to air opening or plugged tube shall not be less than 200mm.

3. Hanging bracket should not be hung above flange.

4. Thickness of flange gasket should be 3-5mm. Gasket should be flat on flange and inserting to pipe is not allowed. Set up fixed points at proper place for hanging pipe to prevent vibration.

5. Vertical splice seam of duct should be stagger. Make sure there is no vertical seam at the bottom of duct installed horizontally. As for the installation of flexible short duct, keep proper tightness and no distortion.

6. All metal parts (including supporting, hanging and mounting bracket) on pipeline system engineering should be conducted anti-corrosion treatment.

5.4. Installation of Assembly

1. The regulating device of duct should be installed in place where is easy to operate, flexible and

reliable.

2. The air port should be installed firmly and air pipe should be connected tightly. Frame should be tightly contact with decorate of building. The appearance should be smooth and flat, and regulation is flexible.
3. If air port is installed horizontally, deviation of levelness is no more than $3/1000$. If air port is installed vertically, deviation of perpendicular should be no more than $2/1000$.
4. The same air port in same room should be installed at the same height, and put in order.

6. Heat Insulation Engineering

The insulation of refrigerating equipment and pipe is carried out through general insulation method, which binding the equipment and pipe with solid multi-hole insulation material and exploiting proper wet-proof and protection measures, called insulation structure. The form of insulation structure shall be different in light of different insulation materials. This is a traditional insulation method which is adopted very early. Although its insulation performance is general, but it is simply in structure, convenient in construction and cheap in price, so that it is widely used in refrigeration engineering.

6.1 Insulation of Refrigerant Piping

6.1.1. Operational procedure of refrigerant piping insulation

Construction of refrigerant pipe → insulation (excluding connecting section) → test for air sealing → connecting section insulation

Connecting section: for instance, insulation construction just could be carried out after air tightness test at welding area, opening expending area and flange joint is successful.

6.1.2. Purpose of refrigerant piping insulation

1. During operation, temperature of gas pipe and liquid pipe shall be over-heating or over-cooling extremely. Therefore, it is necessary to carry out insulation; otherwise it shall reduce the performance of unit and burn compressor.
2. Gas pipe temperature is very low during cooling. If insulation is not enough, it shall form dew and cause leakage.
3. Temperature of outlet pipe (gas pipe) is very high (generally 50-100°C) during heating. Touching due to carelessness shall cause hurt, so it is necessary to take insulation measures to avoid getting hurt.

6.1.3. Selection of insulation materials for refrigerant piping

Adopt hole-closed foam insulation materials with level B1 of burning retardant and over 120°C of constant burning performance.

6.1.4. Thickness of insulation layer

1. When outer diameter of copper pipe (d) is less than or equal to 12.7mm, the thickness of insulation layer (δ) shall be above 15mm.

When outer diameter of copper pipe (d) is more than or equal to 15.88mm, the thickness of insulation layer (δ) shall be above 20mm.

2. In hot and wet environment, the above recommended value shall be increased one time.

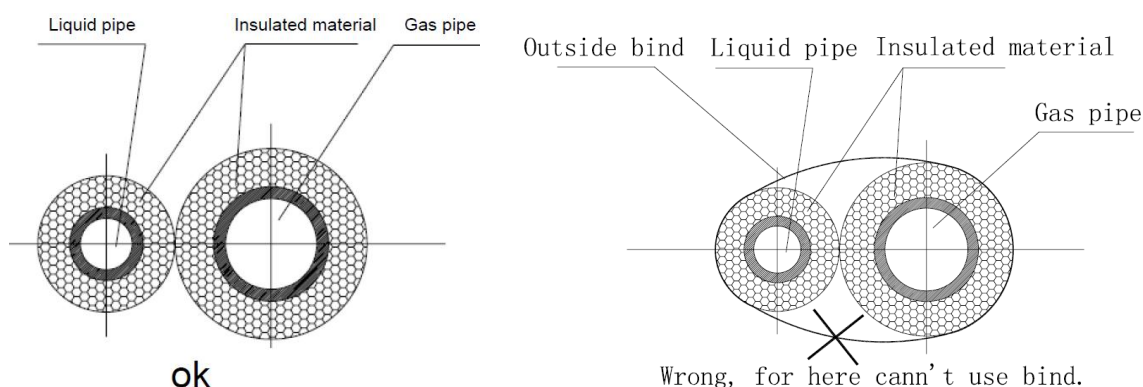
Note: The outdoor pipeline shall be protected by metal case to proof sunshine, storm and air erosion, and prevent damage of external force or man-made destroy.

6.1.5. Installation and highlights of insulation construction

1. Example of wrong operation: Gas pipe and liquid pipe are carried out insulation together; causing the operation effect of air conditioner is bad.

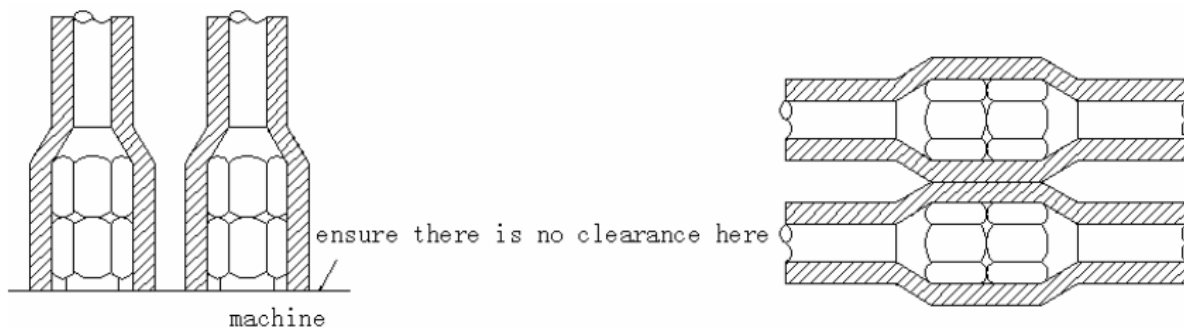
2. Example of correct operation:

- a. Gas pipe and liquid pipe are carried out heat insulation separately.



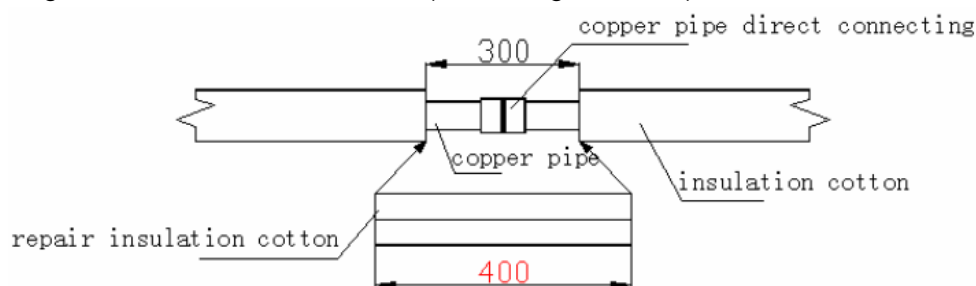
Note: After gas pipe and liquid pipe are carried out heat insulation separately, bind with tape. If it is bound over tightly, the spliced insulation joint shall be damaged.

b. The surrounding of pipe connecting section shall be carried out insulation entirely.



Highlights:

1. No gap in joint of insulation materials.
2. If the joint of insulation materials is linked tardily and tape is bound over tightly, shrinkage and leakage shall be produced easily to create phenomena of dew-drop. The over-tightened tape shall edge out air in material, leading to decrease the insulation effect at this part; meanwhile tape shall be easily aged and drop down.
3. In indoor shield space, it is no necessary to bind belting, so as to avoid influencing insulation effect. Correct repairing method for insulation cotton: (see the figure below)



Firstly cut out the material longer than gap, expend the two ends and embed the insulated cotton, at last, paste joint with glue.

Highlights of insulation repairing:

1. Repaired length of insulation (insulation tube with filled gap) shall be 5-10cm longer than the length of gap under natural status.
2. Sliver the cut of insulation to be repaired and cross-section shall be even.
3. Insert gap with insulation for repairing and cross-section shall be pressed tightly.
4. All cross-section and cut need to be pasted with glue.
5. Finally, bind the seam with rubber/plastic tape.
6. Prohibit conducting insulation by using binder fabric in concealed section, so as to avoid influencing insulation effect.

6.2 Insulation of Condensate Water Pipe

6.2.1. Insulation of condensate water pipe

1. Select rubber/plastic tube with burning retardant of rating B1.
2. Thickness of insulation layer is usually above 10mm.
3. The insulation material at water outlet of unit body should be pasted with glue on the unit body, so as to avoid dewing and dripping.
4. Pipe installed in wall shall not be conduct insulation.
5. Use specific glue to paste the seam of insulation material, and then bind with cloth tape. The width of tape shall not be less than 5cm. Make sure it is firm and avoid dewing.

6.3 Insulation of Duct

I. Insulation of duct

1. Insulation of duct parts and equipment should be conducted after confirming that the leakage test and quality of duct is qualified.
2. Usually making use of centrifugal glass cotton, rubber/plastic material or other late-model insulation duct to conduct insulation.
3. Insulation layer should be even and tight. Crack, gap and other defects are not allowed.
4. The supporting, hanging and mounting bracket of duct should be set up to the outside of insulation layer, and insert bed timber between bracket and duct.
5. Thickness of insulation layer
 - 1) As for the inlet and outlet duct installed in room free of air conditioner, the thickness of insulation layer should be above 40mm when adopting centrifugal glass cotton for insulation.
 - 2) As for the inlet and outlet duct installed in room with air conditioner, the thickness of insulation layer should be above 25mm when adopting centrifugal glass cotton for insulation.
 - 3) When adopting rubber/plastic material and other materials, the thickness of insulation layer should be come out in accordance with design requirement or calculation.

7. Electrical Engineering

Please refer to “Part 3. Outdoor Units Specification & Performance”.

Highlights of electrical installation

1. Purchased wiring, parts and materials should be in compliance with the local and national regulations.
2. All field wiring construction should be finished by qualified electrician.
3. Air conditioning equipment should be grounded according to the relevant local and national electrical regulations.
4. Current leakage protection switch should be installed (select current leakage breaker in light of the 1.5-2 times of total loading rated current.)
5. When connecting wiring and wire holder, use cable clamp to fix and make sure no exposure.
6. Refrigerant piping system and wiring system of indoor and outdoor unit belongs to the different system.
7. Do not connect the power wire to the terminal of signal wire.
8. When power wire is parallel with signal wire, put wires to their own wire tube and remain proper gap (the current capacity of power wire is: 10A below 300mm, 50A below 500mm).
9. Voltage discrepancy of power wire terminal (side of power transformer) and end voltage (side of unit) should be less than 2%. If its length could not be shortened, thicken the power wire. Voltage discrepancy between phases shall not pass 2% rated value and Current discrepancy between highest and lowest phase should be less than 3% rated value.

Selection of Wiring

1. The selection of wiring area shall in accordance with the requirements below:
 - 1) Voltage lose of wire shall meet the requirement of terminal voltage for normal operation and startup.
 - 2) The wiring current-carrying capacity determined by installed method and environment is not less than the largest current of unit.
 - 3) Wiring shall ensure the stability of movement and heating.
 - 4) The smallest sectional area should satisfy the requirement of mechanical strength.

Sectional area of core to phase line $S(\text{mm}^2)$	Smallest sectional area of PE line (mm^2)
$S \leq 16$	S
$16 < S \leq 35$	16
$S > 35$	$S/2$

When earth protection line (shortly called PE line) is made of material the same as phase line, the smallest sectional area of PE line should be in accordance with the regulation below:

Sectional area of core to phase line $S(\text{mm}^2)$ Smallest sectional area of PE line (mm^2)

Distribution highlights of distribution wiring

1. When distributing wiring, select wirings with different colors for phase line, zero line and protection earth according to relevant regulations.
2. The power wire and control wire of concealed engineering is prohibited to bind together with refrigerant piping. It is necessary to pass through wire tube and be distributed separately, and the gap between control line and power wire should be 500mm at least.
3. When distributing wiring by passing through pipe, the following should be paid attention to:
 - 1) Metal wire tube could be used in indoor and outdoor, but it is not suitable to place with acid - alkali corrosion.
 - 2) Plastic wire tube is generally used in indoor and place with corrosion, but it is not suitable to situation with mechanical damage.
 - 3) The wiring through pipe shall not be in the form with ends jointing. If joint is a must, connection box

should be installed at the corresponding place.

- 4) The wiring with different voltage should not pass through the same wire tube.
- 5) Total sectional area of wiring through wire tube shall not exceed 40% valid area of stuffing tube.
- 6) Fixing point of wire tube support shall follow the standard below:

Nominal diameter of wire tube (mm)	Largest gap between fixed points of wire tube	
	Metal pipe	Plastic pipe
15-20	1.5	1
25-32	2	1.5
40-50	2.5	2

Nominal diameter of wire tube Largest gap between fixed points of wire tube

Control System and Installation

Connecting highlights of control line (RS-485 communication)

1. The control line should be shielded wire. Using other wiring shall create signal interference, thus leading to error operation.
 2. Single end to shield net of shielded wire should be grounded.
- Note: The shield net should be grounded at the wiring terminal of outdoor unit. The inlet and outlet wire net of indoor communication wire should be connected directly and could not be grounded, and form open circuit at the shield net of final indoor unit.
3. Control wire could not be bound together with refrigerant pipeline and power wire. When power wire and control wire is distributed in parallel form, keep gap between them above 300mm so as to preventing signal interference.
 4. Control wire could not form closed loop.
 5. Control wire has polarity, so be careful when connecting.

8. Commissioning

8.1 Work before Commissioning

8.1.1. Inspection and confirmation before Commissioning

1. Check and confirm that refrigeration pipe line and communication wire with indoor and outdoor unit have been connected to the same refrigeration system. Otherwise, operation troubles shall happen.
2. Power voltage is within $\pm 10\%$ of rated voltage.
3. Check and confirm that the power wire and control wire are correctly connected.
4. Check whether wire controller is properly connected.
5. Before powering on, confirm there is no short circuit to each line.
6. Check whether all units have passed nitrogen pressure-keeping test for 24 hours with R410A: $40\text{kg}/\text{cm}^2$.
7. Confirm whether the system to Commissioning has been carried out vacuum drying and packed with refrigeration as required.

8.1.2. Preparation before Commissioning

1. Calculating the additional refrigerant quantity for each set of unit according to the actual length of liquid pipe.
2. Keep required refrigerant ready.
3. Keep system plan, system piping diagram and control wiring diagram ready.
4. Record the setting address code on the system plan.
5. Turn on power switches outdoor unit in advance, and keep connected for above 12 hours so that heater heating up refrigerant oil in compressor.
6. Turn on gas pipe stop valve, liquid pipe stop valve, oil balance valve and gas balance valve totally. If the above valves do not be turned on totally, the unit should be damaged.
7. Check whether the power phase sequence of outdoor unit is correct.
8. All dial switches to indoor and outdoor unit have been set according to the Technical Requirement of Product.

Note: The setting of outdoor unit's dial switch should be conducted under power-off, otherwise the unit shall not identify. The following table shows the address and power of outdoor master and slave unit:

ADDRESS dial switch		POWER dial switch	
0	Master unit	0	8HP
1	Slave unit 1	1	10HP
2	Slave unit 2	2	12HP
3	Slave unit 3	3	14HP
≥ 4	Invalid address, system error	4	16HP
/		≥ 5	Invalid dial switch

8.2 Commissioning of Trial Run

8.2.1. Commissioning for trial run of single unit.

1. Each independent refrigeration system (i.e. each outdoor unit) should be conducted trial operation.
2. Detection details of trial run:
 - 1) As for fan in unit, make sure the rotating route of its impeller is correct and impeller turns around smoothly. No abnormal vibration and noise.
 - 2) Check whether there is abnormal noise during operation of refrigerant system and compressor.
 - 3) Check outdoor unit whether it can detect each indoor unit.
 - 4) Check whether drainage is smooth and its lift pump can be in motion.

- 5) Check whether microcomputer controller can be in motion normally and whether any trouble appears.
- 6) Check whether operating current is within the allowed range.
- 7) Check whether each operating parameter is within the range permitted by the equipment.

Note: When conducting trial run, separately test cooling mode and heating mode to judge the stability and reliability of system.

8.2.2. Commissioning for the trial run of the paralleled system

1. Check and confirm that operation of single unit is normal through trial operation. After confirm it is normal, conduct operation of the whole system, i.e., Commissioning of MDV system.
2. Commissioning is carried out according to the Technical Requirement of Product. When Commissioning, analyze and record operation status so as to understand the operation status of the whole system for convenient maintenance and examination.
3. After finishing Commissioning, fill out Commissioning report in detail.

The commissioning report form is shown as follows:

Commissioning Report for Midea MDV Pro System

Date: _____dd_____mm_____yy

Item name:	
Address:	Tel:
Supplier:	Delivery date: dd mm yy
Installation section:	Principal:
Commissioning section:	Principal:
Remark: recharged refrigeration quantity to system: _____kg <div style="text-align: right;">Name of refrigerant:_____ (R22, R407C, R410A)</div>	

Installing section: _____
(seal)

Commissioning name: _____
(seal)

Signature: _____

Signature: _____

Date: _____dd_____mm_____yy

Date: _____dd_____mm_____yy

Test Data for Test Run of _____ System

Model of outdoor unit	Production series no.

Operation data of outdoor unit (Cooling)

Unit	No.1	No.2	No.3
Run Voltage V			
Total current of run A			
Operation current of compressor A			
High-pressure pressure Kg/cm ²			
Low-pressure pressure Kg/cm ²			
Inlet air temperature °C			
Outlet air temperature °C			

Operation data of indoor unit

No.	Position	Model	Bar code of indoor unit	Inlet air temperature °C	Outlet air temperature °C
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					

System parameter

SW2:

(CHECK)——Used to query outdoor unit data. Check point sequence and corresponding actuality is as follows:

No.	Display code	Display content	Note	No.	Display code	Display content	Remark
1	0--	Address of outdoor unit	0,1,2,3	17	16--	TP saturation temp	Actual value+30
2	1--	Capacity of outdoor unit	8,10,12,14,16,18	18	17--	Current of inverter compressor	Actual value
3	2--	Qty. of Modular outdoor unit	Setting on main unit	19	18--	Current of fixed compressor	Actual value
4	3--	Setting of indoor units	Setting on main unit	20	19--	Opening angle of EXV-1	Actual value ÷ 8
5	4--	Total cap. of outdoor unit	Setting on main unit	21	20--	Opening angle of EXV-2	Actual value ÷ 8
6	5--	Total requirement of indoor unit	Available for main unit	22	21--	High pressure	Actual value × 10
7	6--	Total requirement of main unit corrected capacity	Available for main unit	23	22--	Qty. of indoor unit	If no, display 00
8	7--	Operation mode	0,2,3,4	24	23--	Qty. of operating indoor units	
9	8--	This outdoor units actual operation capacity	Capacity requirement	25	24--	Priority mode	
10	9--	Speed of fan 1	Actual value	26	25--	Noise control mode	0,1,2,3
11	10--	Speed of fan 2	Actual value	27	26--	Reserve	
12	11--	T2/T2B average Temp	Actual value	28	27--	DC Voltage	
13	12--	T3 Pipe	Actual value	29	28--	Reserve	
14	13--	T4 ambient temp	Actual value	30	----	The last error or protection code	Without error/protection display 8.8.8
15	14--	Discharge Temp. of Inverter Compressor	Actual value	31	----	--	Check end
16	15--	Discharge Temp. of fixed compressor	Actual value				

Note: When operation of system lasts 1 hour and stays stability, press checkup button on PCB of outdoor master unit, query one by one and fill out the above table according to facts.

Description of display:

Operation mode: 0---Turn off; 2---Cooling; 3---Heating; 4---Constraint cooling

Fan speed: 0—OFF; 1~15—Speed increasing sequentially; 15—is the max. fan level.

PMV opening angle: pulse count = display value × 8.

Noise control mode: 0—Night silent mode; 1—Silent mode; 2—super silent mode; 3—no priority

Priority mode: 0—heating priority mode; 1—cooling priority mode; 2—opening the priority mode; 3—response the heating mode only; 4—response the cooling mode only.

SW1: Constrain cool button

SW2: Query switch

ENC1: Outdoor units address setting switch. ENC2: Outdoor units capacity setting switch. ENC3: Indoor units Qty. Setting switch.

ENC4: Network address setting switch.

Normal display: when in standby mode, it indicates number of indoor units, when running, it indicates output percentage value of compressor.

Part 5

Troubleshooting

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1. Normal Air Conditioner Phenomenon

1.1 When outdoor unit appears white vapor or water, the reasons is as follows:

- 1) The fan of outdoor unit stops to begin defrosting0.
- 2) The electromagnet valve sends out the noise when the defrosting begins and ends.
- 3) There is sound like water flowing when running or off; and the noise enlarges after running for 3 minutes. This is the sound of refrigerant flowing or discharging water gathered by dehumidifying.

1.2 Outdoor units send out the noise of “pupu”, for temperature changes to heat exchanger heat expanded or cool compact.

1.3 Indoor units send out odor smell, because it absorbs the smell of house, furniture or smoking.

1.4 The running light of indoor unit flickers, the reasons are generally as follows:

- 1) Power supply ever failed during running period.
- 2) For 1-to-several, the following induces the director lighting and the operation stopping
 - ① Other indoor units running at heating mode induce to this indoor unit cannot run at cooling mode
 - ② Setting mode conflicts with the fixed mode.
 - ③ Stop fan to prevent discharging cool air.

1.5 The “no priority” or “waiting” director light of operation board lights.

1.6 Auto running or stopping for the timer wrong operation.

1.7 Cannot run, the reasons are as follows:

- ① Power is off.
- ② Manual switch is pulled to off side.
- ③ Fuse is cut.
- ④ Protect device starts, at the same time running director lights.
- ⑤ Timer’s setting time is over, at the time running director lights.

1.8 Heating or cooling is inefficient.

- ① Filter is block by duct or rubbish.
- ② The place of air deflector is unfit.
- ③ Fan mode is “slight” or running mode is “fan”.
- ④ Setting temperature is unfit.
- ⑤ Simultaneously choose the heating and cooling mode, at the time the “no priority” or “waiting” director light of panel lights.

2. Air Conditioner Protection in Common

2.1 Compressor protection.

When power is on, or machine stops then restarts right away, outdoor unit will run in 3 minutes to protect the compressor from too frequent starts and stops.

2.2 When the protection device functions, running stops. Refer to the following:

- ① forced to start but not possess the start article, and display light lights.
- ② When cooling running, inlet and outlet of outdoor unit are blocked, outside strong air blows into outdoor unit's outlet.
- ③ When heating running, dust adheres to air filter to block inlet or outlet of outdoor unit.

Note: when protecting, please cut manual power switch. After checking the reason and solving it, restart.

2.3 Power fails.

- ① If power supply fails while machine is running normally, system will record this.
- ② When the machine is powered on again, the running light of wire controller would flash to inform user about this.
- ③ Press the on/off key of wire controller to confirm this before restart the system.

Note: When running, if system takes place mistaken operation or lighter, please pull down the power supply switch to cut it off. Before restarting machines, please press the on/off key again as above.

3. Malfunction Code and Troubleshooting

If there is phenomenon as follows, please stop air conditioner running and cut power supply and refer to the following. However, if the problem insists, please contact the customer service center of Midea commercial air conditioner company, and offer machine's model and detailed malfunction.

Code	Malfunction or protection	Remark
E0	Outdoor unit communication malfunction	Only Slave unit displays
E1	Phase sequence malfunction	
E2	Communication between Master outdoor unit and indoor units	
E3	reserved	
E4	Outdoor Ambient temp. sensor malfunction	
E5	Voltage malfunction	
E6	reserved	
E7	Discharge temp. sensor malfunction	
E8	Outdoor unit address is wrong	
E9	EEPROM is not matched	
H0	Communication malfunction between IR341 and MC9S08AC128	
H1	Communication malfunction between 0537 and MC9S08AC128	
H2	Outdoor unit quantities decreasing malfunction	Only master unit displays
H3	Outdoor unit quantities increasing malfunction	Only master unit displays
H4	3 times P6 protection caused in 30 minutes.	Refer to P6 for repair
H5	3 times P2 protection caused in 60 minutes.	Refer to P2 for repair
H6	3 times P4 protection caused in 60 minutes.	Refer to P4 for repair
H7	Indoor unit quantities decreasing malfunction over 3 minutes	not resume until recovery sets
H8	Pressures sensor malfunction	
H9	3 times P9 protection in 60 minutes	Refer to P9 for repair
P0	The sensor protection on the top of inv. compressor.	
P1	High pressure protection	
P2	Low pressure protection	
P3	Inv. compressor over current protection	
P4	Discharge temp. sensor protection	
P5	Pipe temp. sensor protection	
P6	Module protection	
P7	Fixed compressor current protection	
P8	reserved	
P9	Fan motor module protection	
L0	DC Inverter compressor Module malfunction	
L1	DC generatrix low voltage protection	
L2	DC generatrix high voltage protection	
L3	reserved	
L4	MCE malfunction/simultaneously/cycle loop	
L5	Zero speed protection	
L6	reserved	
L7	Wrong phase protection	
L8	Speed difference >15Hz protection between the front and the back clock	
L9	Speed difference >15Hz protection between the real and the setting speed	

3.1 "E0": Outdoor unit communication malfunction

Outdoor Unit
Display

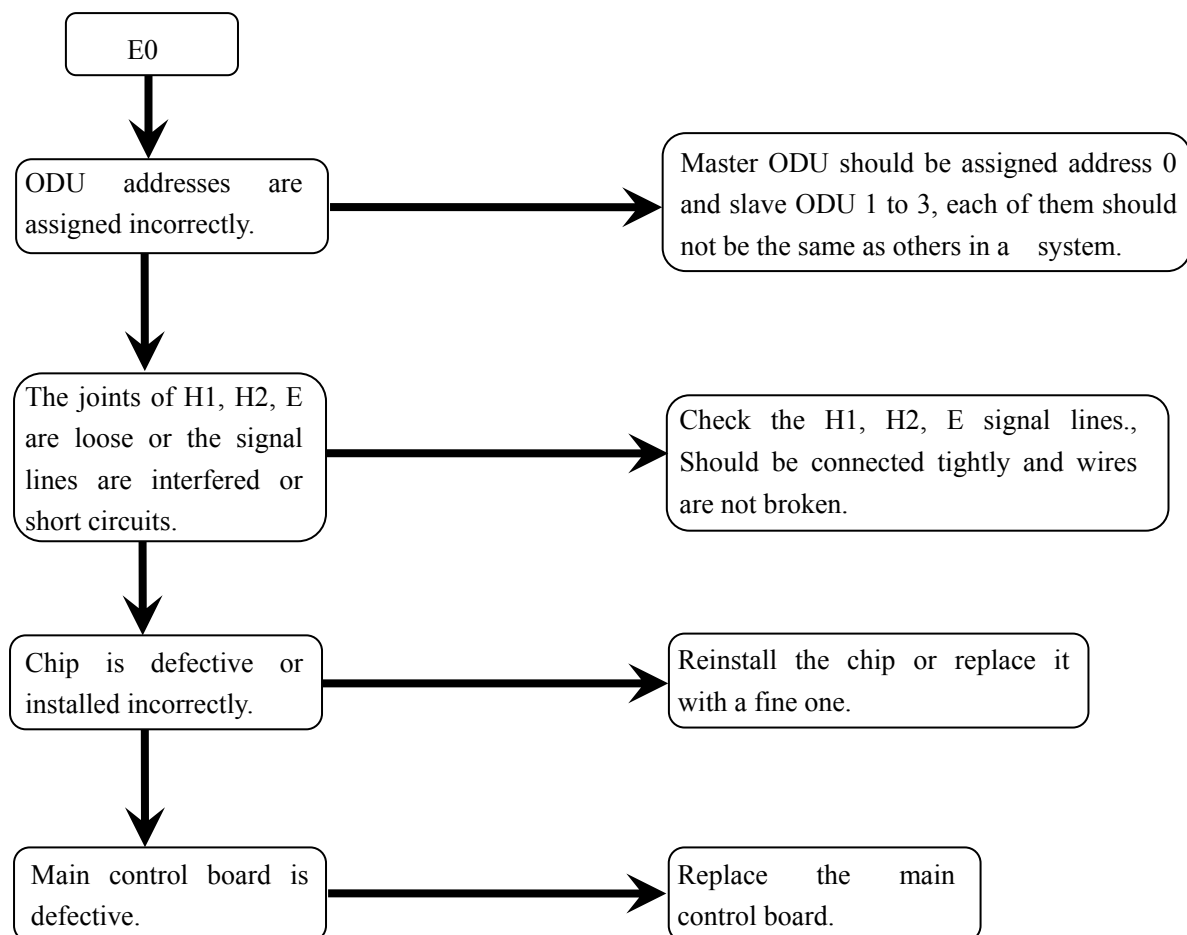
E0 (Only Slave unit displays)

Error Explanation If some ODU compose a combination, we need to connect the H1,H2,E terminals of ODU correctly. Moreover we should switch master unit to address 0, slave 1 unit to 1, slave 2 unit to 2, slave 3 unit to 3. Address 4 and the above are invalid.

Supposed Causes

1. Something wrong with the signal lines.
2. Master ODU is not on or fails.
3. The control boards of slave ODU break down.

Troubleshooting



3.2 "E1": Phase sequence malfunction

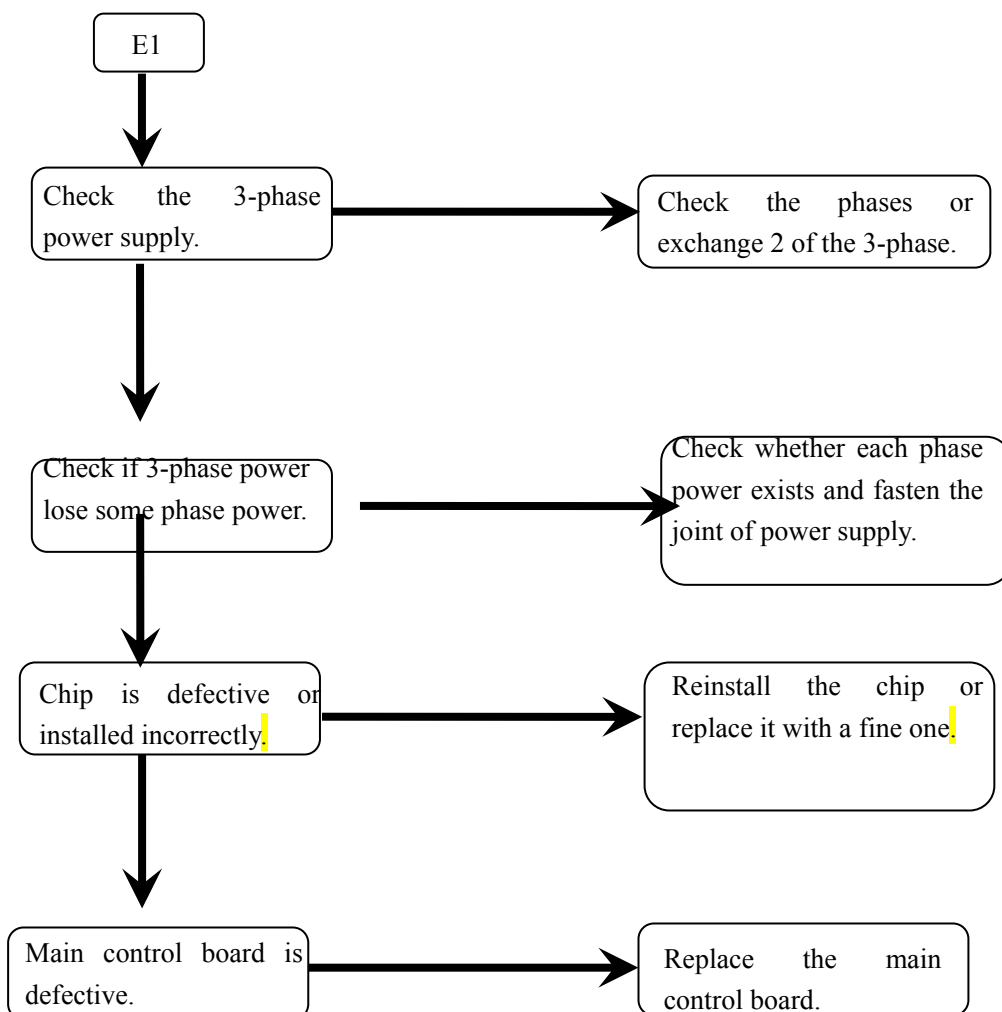
Outdoor Unit
Display

E1

Error Explanation A, B, C terminal of three-phase power supply correspond with U,V,W of the compressor. The compressor could work normally only when they make good matches.

Supposed Causes 1. Phase sequence of the electricity supply does not match.
2. In most circumstance, the reason is lack of power phase.

Troubleshooting



3.3 "E2": Communication failure between master ODU and IDU

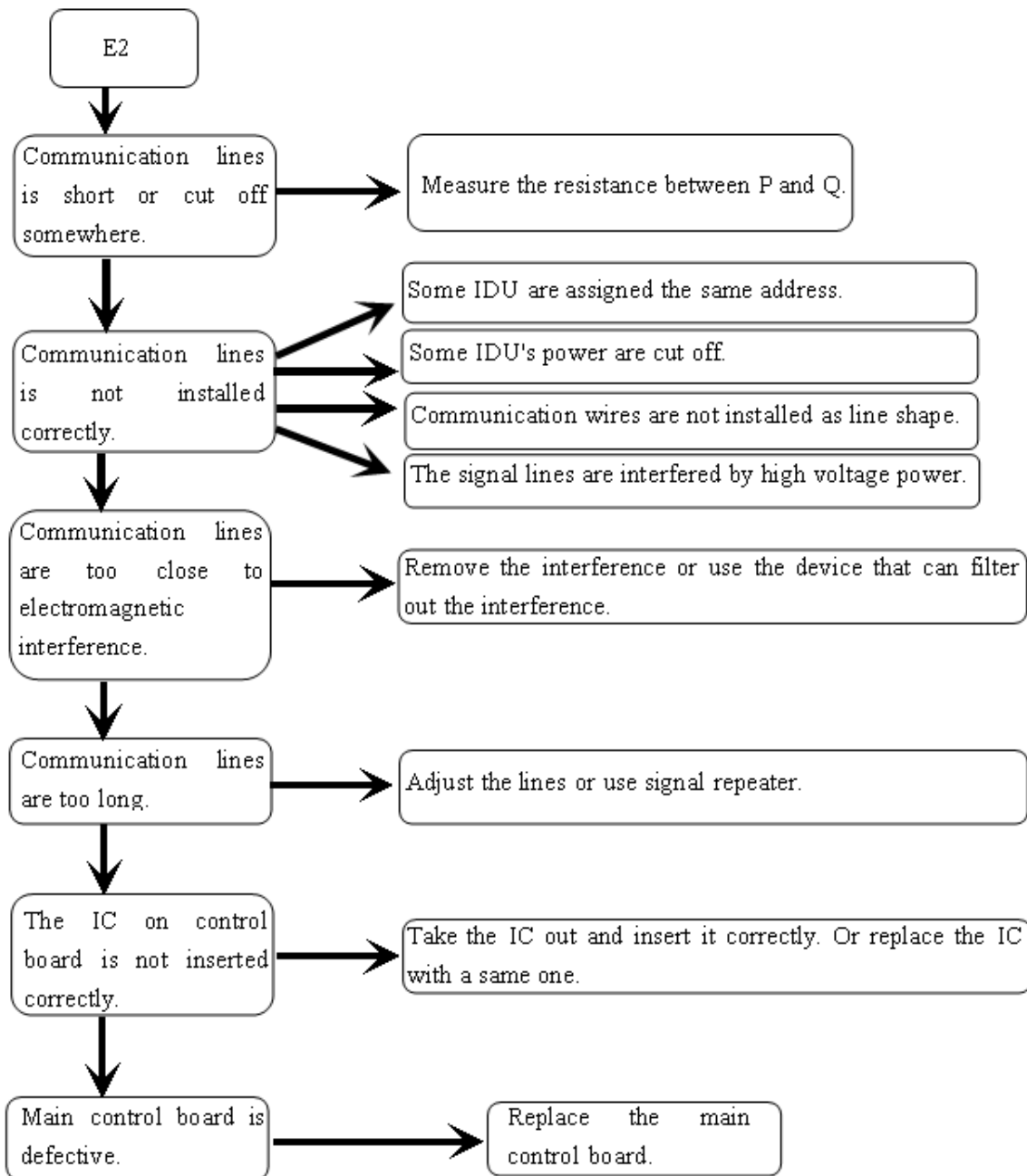
Outdoor Unit
Display

E2(Master unit displays only)

Error Explanation	<ol style="list-style-type: none">1. Timer LED of indoor unit flashes quickly.2. The number of indoor unit that displayed on outdoor unit changes .3. Some of the indoor unit do not work, etc.
----------------------	---

Supposed Causes	<ol style="list-style-type: none">1. IDU have the same address or the net address is set incorrectly.2. The signal lines do not work well.3. PQE bus is conducted somewhere.
--------------------	--

Troubleshooting



Remarks:

1. Press indoor unit's receiver button for 5 seconds, the indoor unit's communication address code is displayed; press it for 10 seconds, capacity code is displayed. Check every unit's address code.

If the indoor unit have no digital display, the indicator light show the address as the follow table:

Director light	Operation	Timer	Fan/Def	Alarm
Code	8	4	2	1

The buzzer is not alarm, the light is on, address code is between 00—15

The buzzer is not alarm, the light is flashing, address code is between 16—31(should plus 16)

The buzzer is alarm, the light is on, address code is between 32—47(should plus 32)

The buzzer is alarm, the light is flashing, address code is between 48—63(should plus 48)

For example,

Press the button for 5 seconds, 1.The buzzer is not alarm, and the running and warning light is on, the indoor unit address is equal to $8+1=9$.

If buzzer is not alarm, the light is flashing, the address need plus 16. The indoor unit address is equal to $(8+1)+16=25$

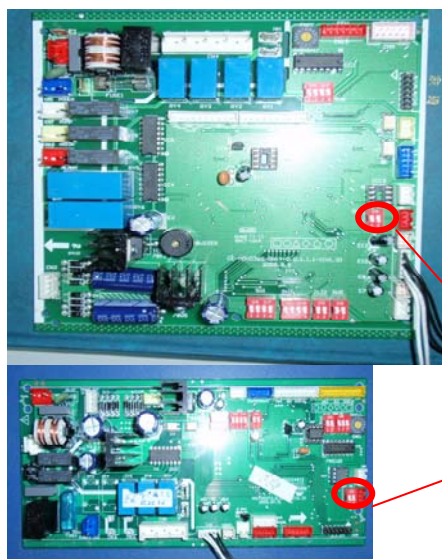
Address code table

Address	0	1	2	3	4	5	6	7	8	9
Capacity (×100W)	22	28	36	45	56	71	80	90	112	140
HP	0.8	1.0	1.2	1.6	2.0	2.5	3.0	3.2	4.0	5.0

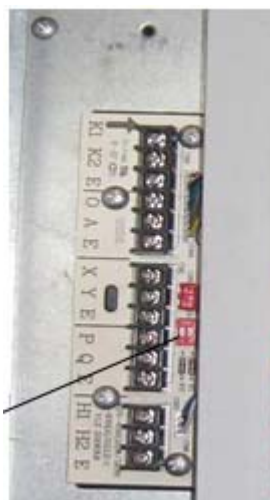
Note: if press 10 seconds, the Timer and the Warning is light on, the capacity code is $4+1=5$, refer to the above tale, 5 means 7.1kw capacity.



2. The last indoor unit should be strengthen the signal for long distance communication, push the SW7 to the on position, which near the PQE wire connector. And push the outdoor unit switch to the on position, which near the PQE wire connector.



Push it to the on position.



3.4 "E4": Ambient temp. sensor malfunction

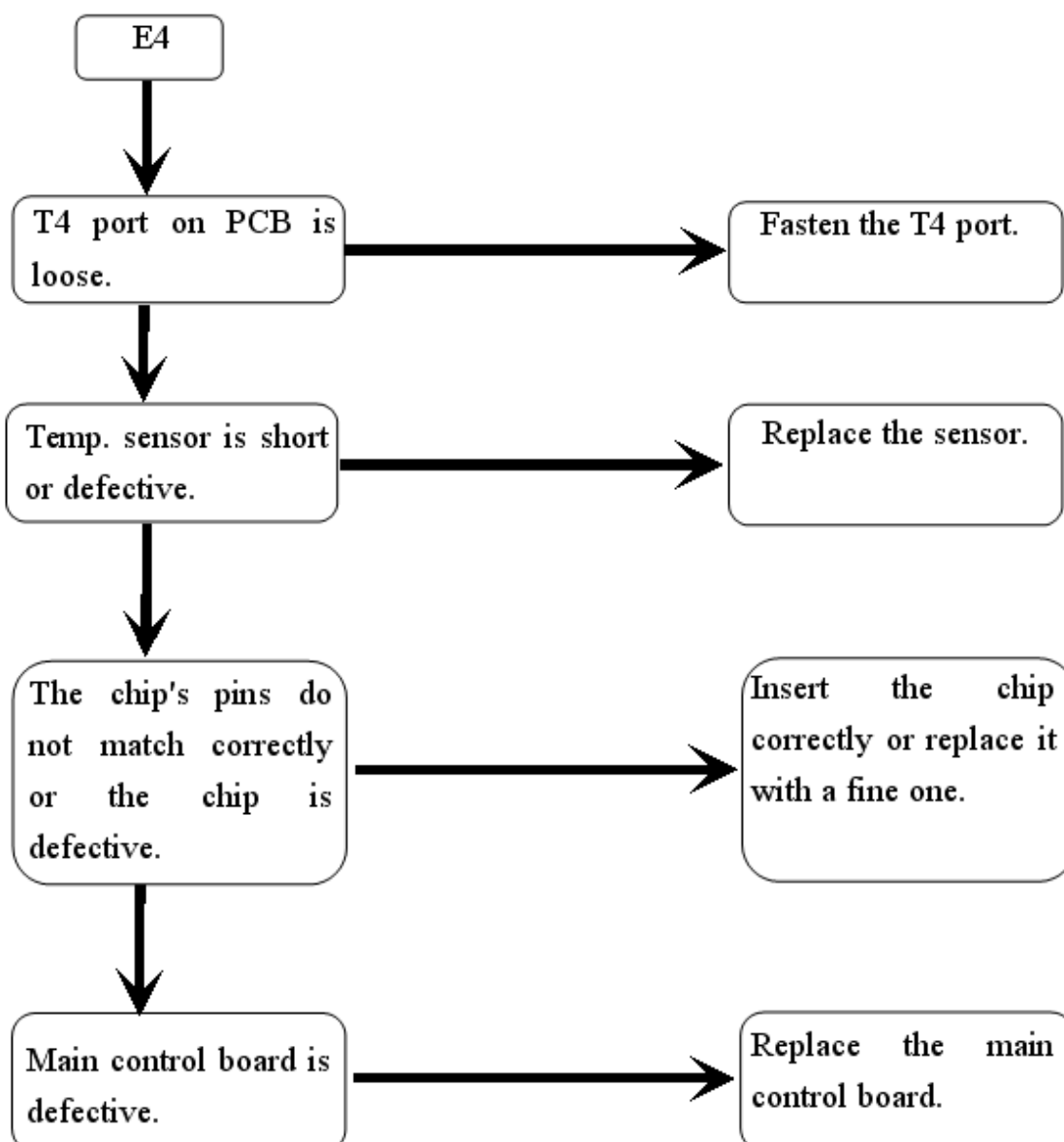
Outdoor Unit
Display

E4

Error ODU displays E4.
Explanation

Supposed Causes
1. The sensor terminal is loose.
2. The sensor circuit is short or open.
3. The main control board's clamp diodes are short or open.

Troubleshooting



3.5 "E5": Voltage malfunction

Outdoor Unit
Display

E5

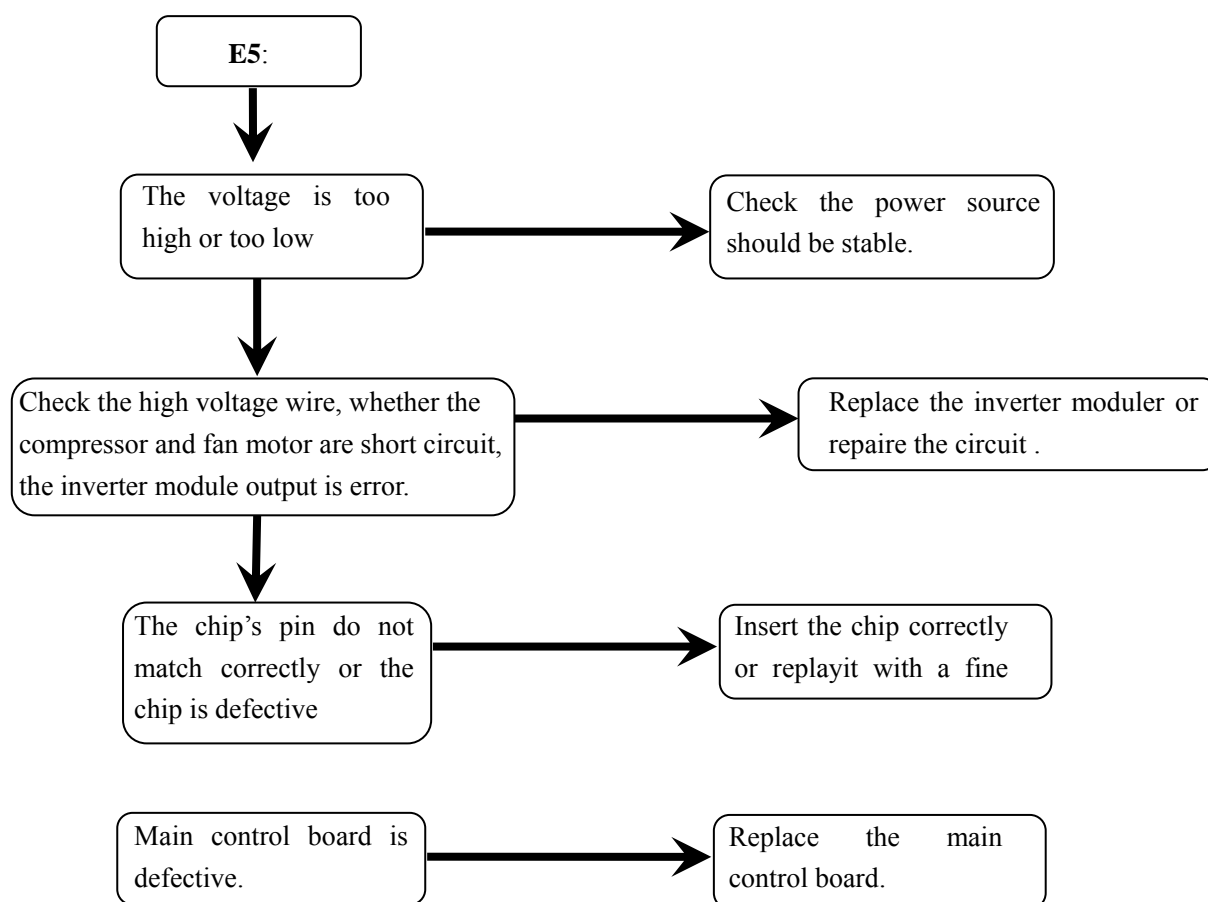
Error ODU displays E5.

Explanation

Supposed The voltage is too high or too low.

Causes

Troubleshooting



3.6 "E7": Ambient temp. sensor malfunction

Outdoor Unit
Display

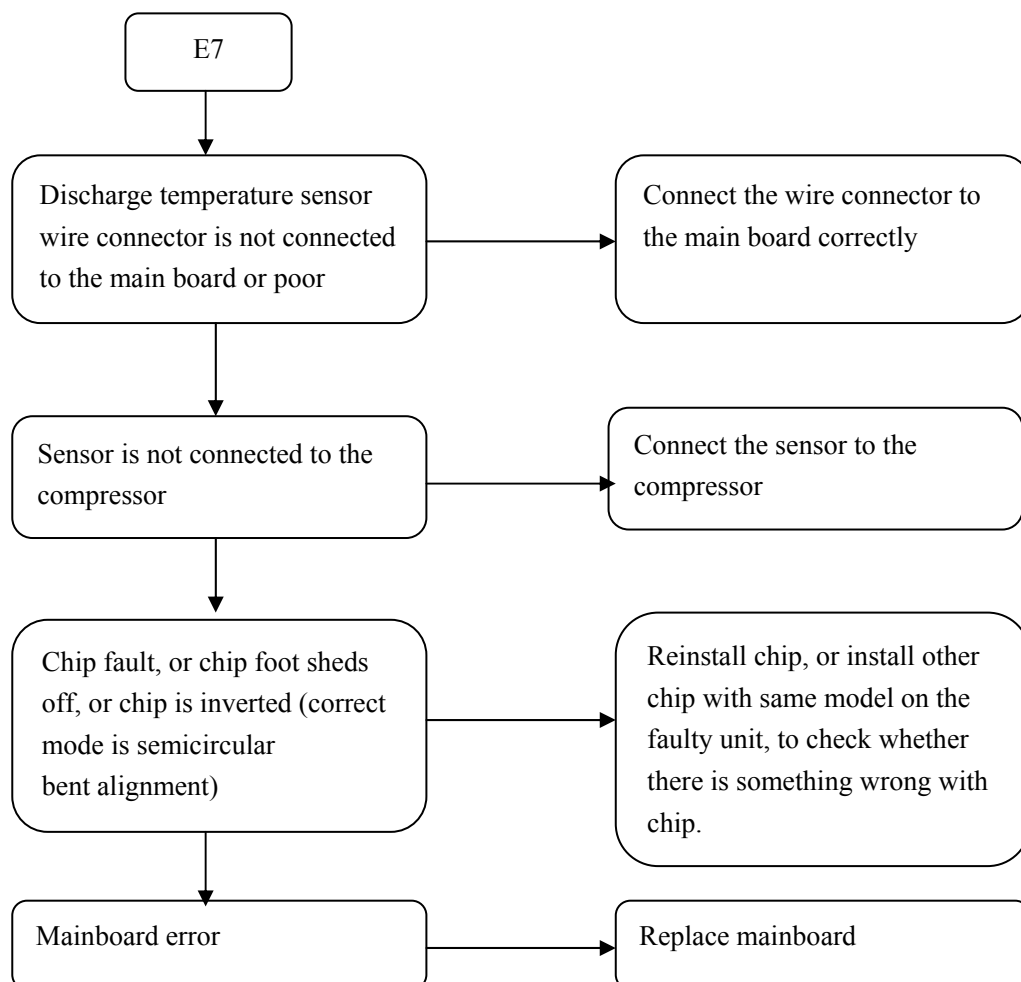
E7

Error ODU displays E7.
Explanation

Supposed Causes

1. Poor connection between discharge temp sensor and mainboard..
2. Sensing bulb is not connected to the compressor.
3. Chip fault, or chip foot sheds off, or chip is inverted.
4. Mainboard error.

Troubleshooting



3.7 "E8": Outdoor unit address is wrong

Outdoor Unit
Display

E8

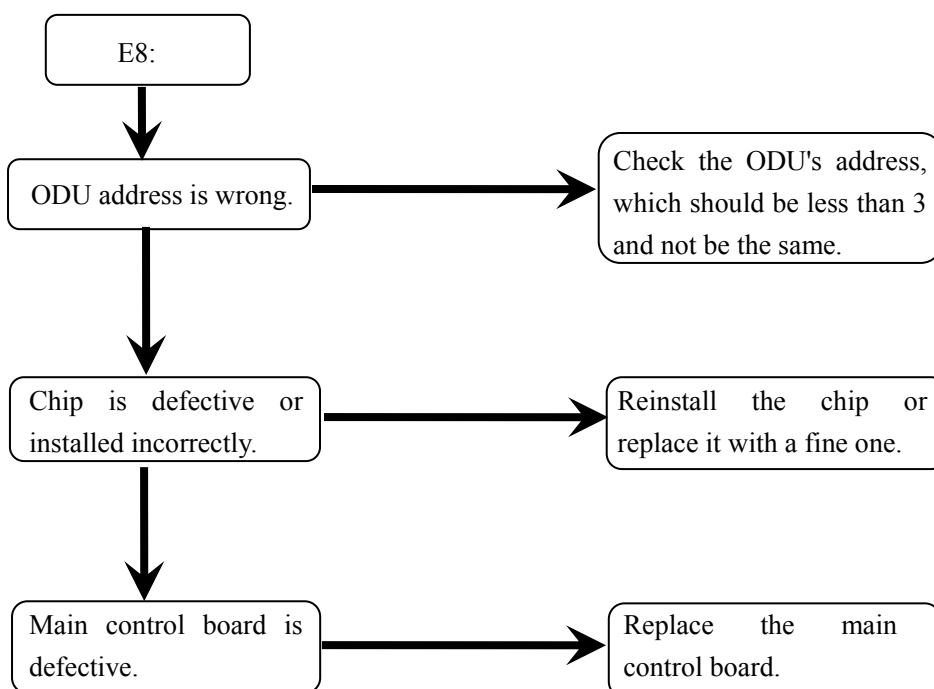
Error ODU displays E8.

Explanation

Supposed ODU is assigned a wrong address.

Causes

Troubleshooting



3.8 "E9": EEPROM is not matched

Outdoor Unit
Display

E9

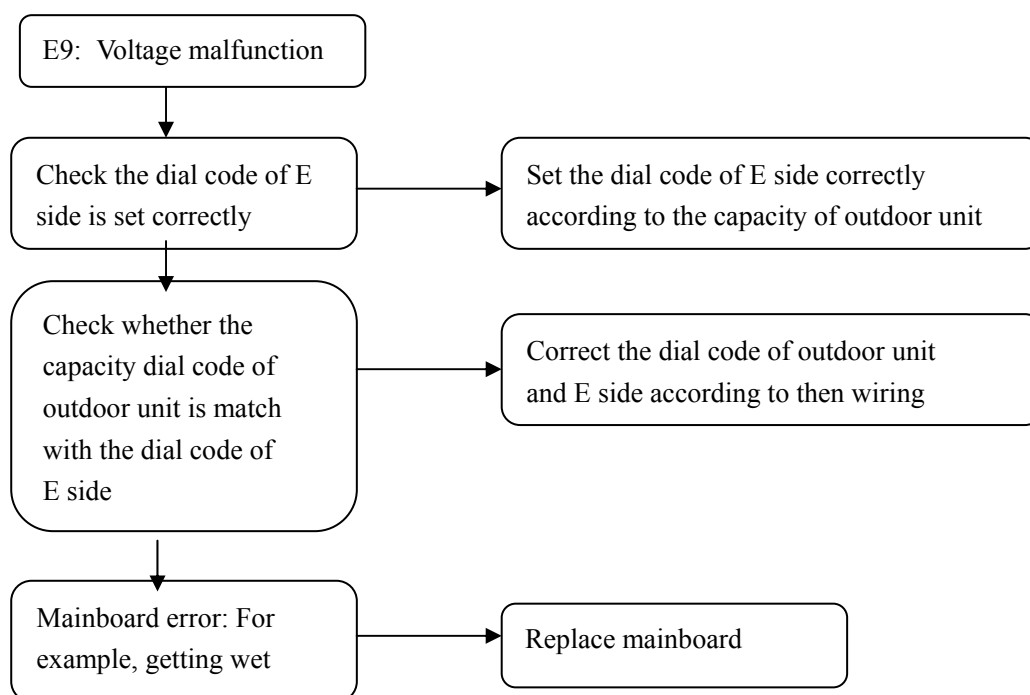
Error ODU displays E9. All the ODU standby.

Explanation

Supposed Causes

- 1.Switch be set the wrong number.
- 2.EEPROM Chip fault, or chip foot sheds off,
- 3.main board fails

Troubleshooting



3.9 "H0": Communication malfunction between IR341 and MC9S08AC128

Outdoor Unit
Display

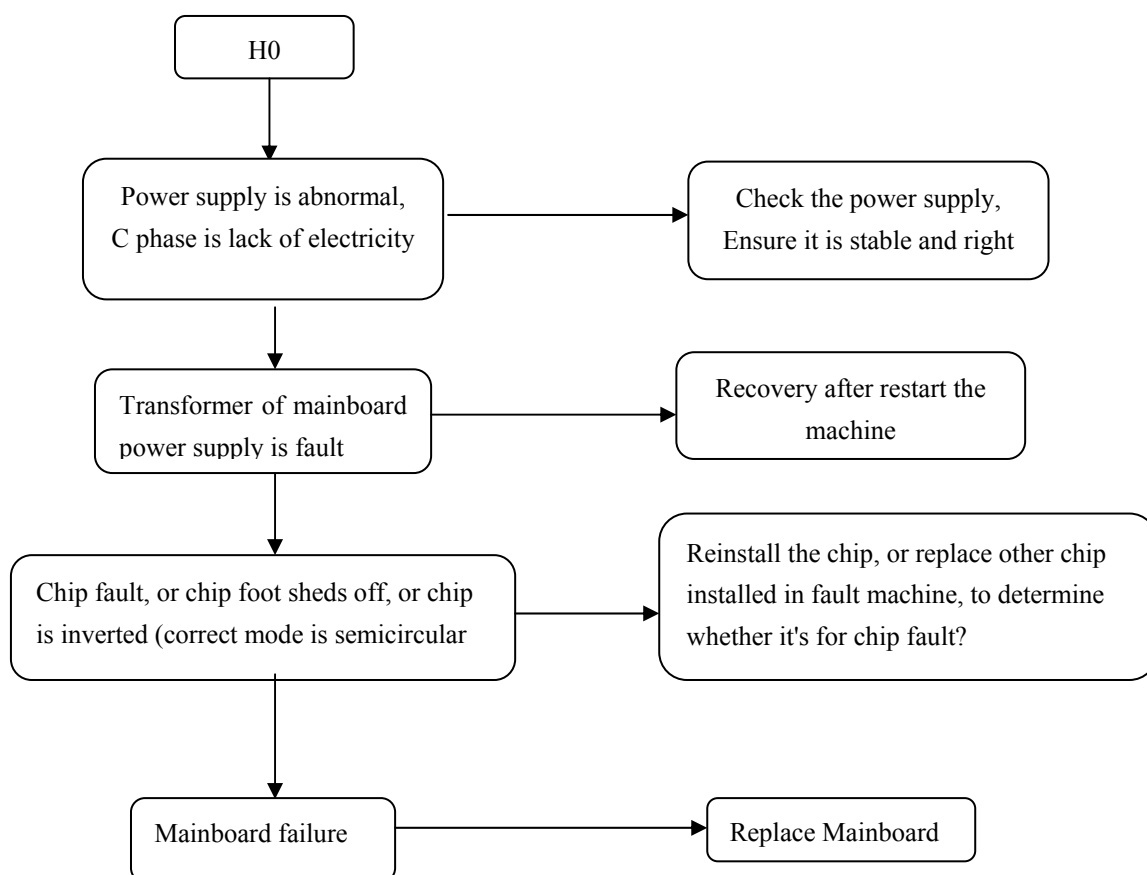
H0

Error Explanation DSP IC is used for providing running parameter to compressor. IC780034 send the system's parameter such as T3, T4, ODU power need, exhaust temp. etc. From which DSP IC calculates the compressor's frequency.

Supposed Causes

1. The power supply of DSP IC fails to work normally.
2. Defect of either the DSP or the MC9S08AC128.
3. Disconnection of the IC MC9S08AC128 pins.
4. Defect of main control board.
5. Environmental interference.

Troubleshooting



3.10 H1: Communication malfunction between IC 0537 and MC9S08AC128

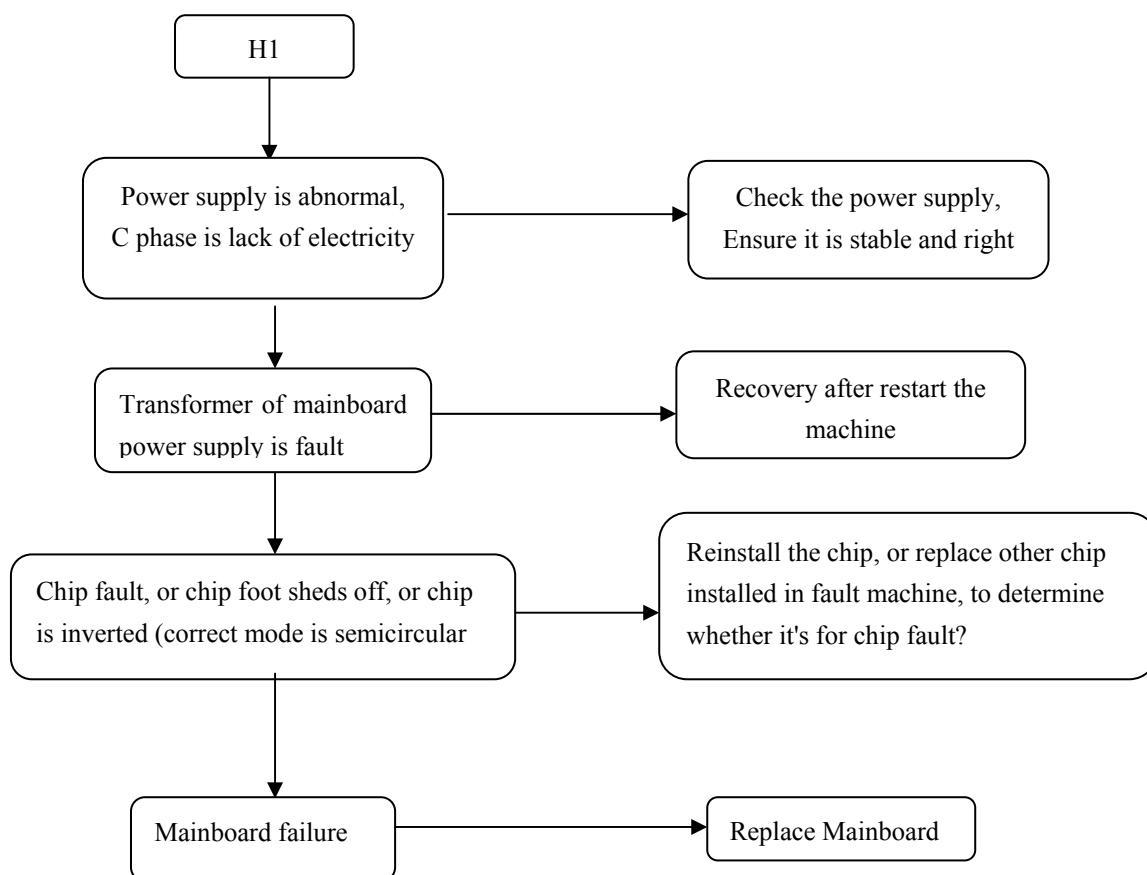
Outdoor Unit
Display

H1

Error Communication error happens between IC 0537 and MC9S08AC128.
Explanation

Supposed Causes 1. Disconnection of the pins of IC MC9S08AC128.
2. Environment interference.

Troubleshooting



3.11 "H2""H3": Outdoor unit quantities decreasing /increasing malfunction

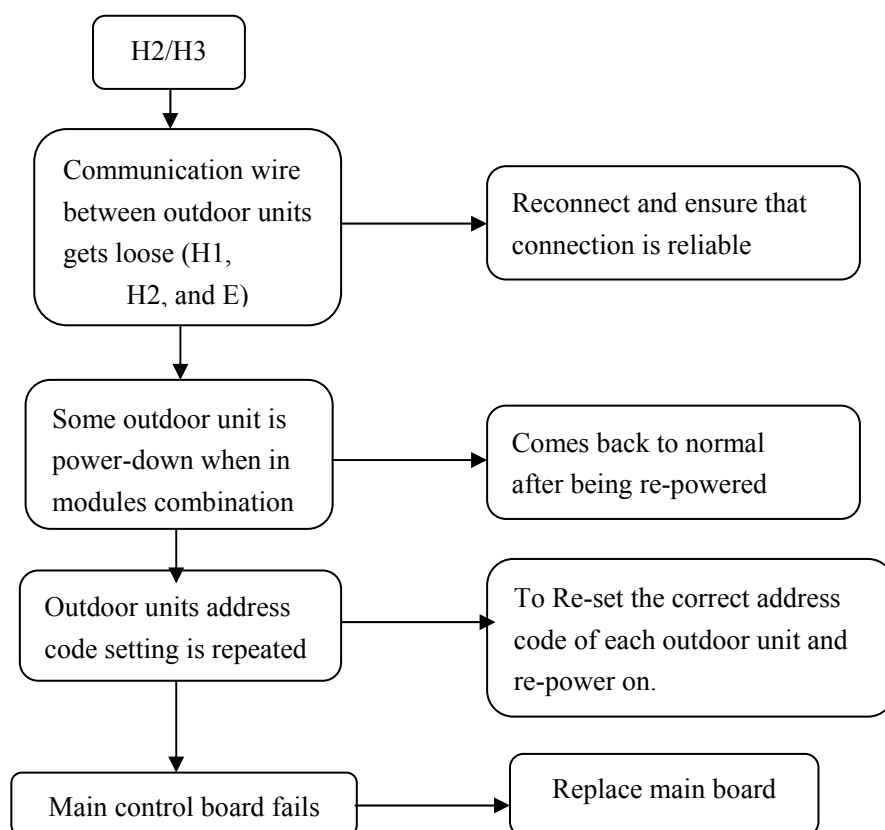
Outdoor Unit
Display

H2/H3 (Master unit displays only)

Error ODU displays H2/H3. All ODU are standby.
Explanation

Supposed Causes 1. ODU communication lines loose.
2. Some of the ODU in combination power off.

Troubleshooting



3.12 "H7": Indoor unit quantities decreasing malfunction

Outdoor Unit
Display

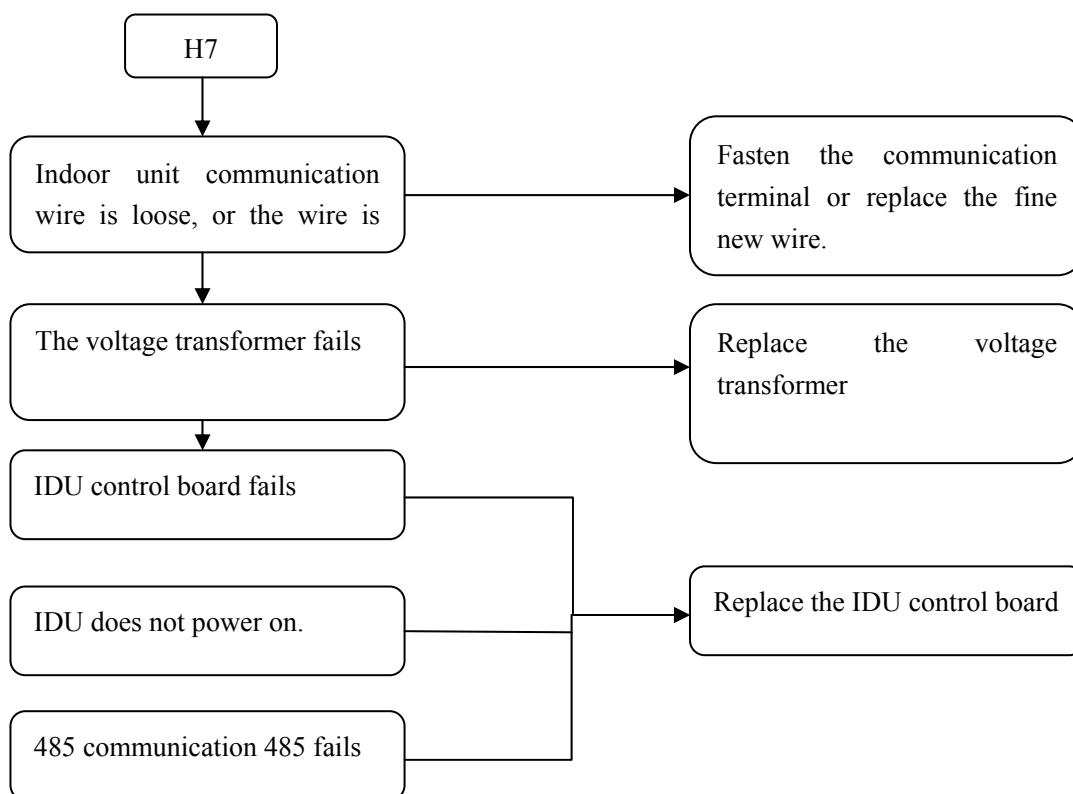
H7

Error ODU displays H7. All the ODU standby.
Explanation

Supposed Causes

1. The communication terminal of IDU is loose.
2. The voltage transformer of IDU is defective.
3. IDU installation is not standard, which are not unified powered.
4. The control board of IDU is defective.

Troubleshooting



3.13 "H8": Pressures sensor malfunction

Outdoor Unit
Display

H8

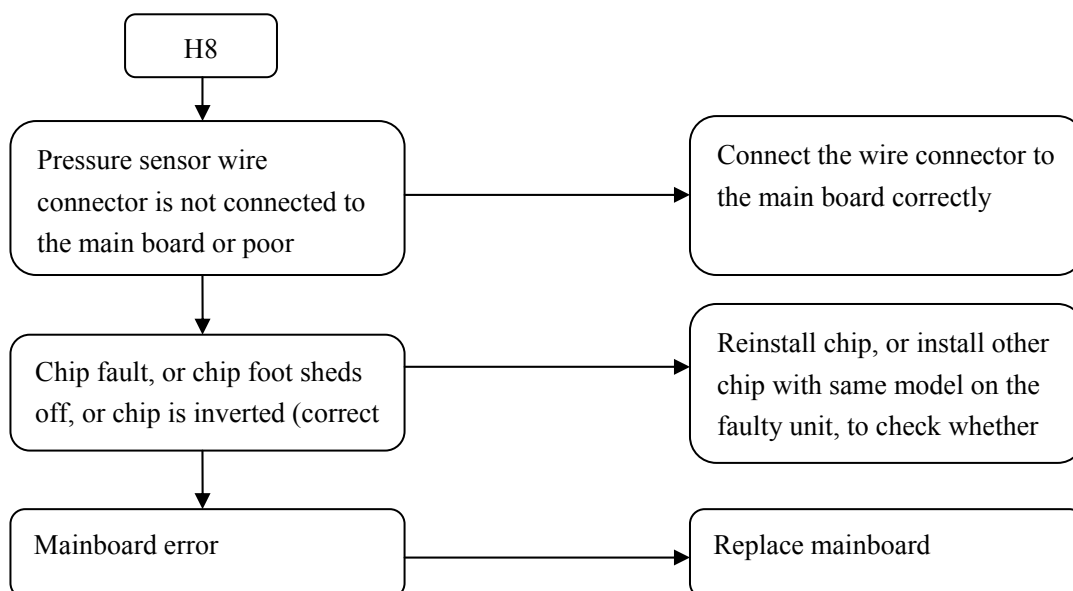
Error ODU displays H8. All the ODU standby.

Explanation

Supposed Causes

1. Poor connection between pressure sensor and mainboard..
2. Chip fault, or chip foot sheds off, or chip is inverted.
3. Mainboard error.

Troubleshooting



3.14 "P0": The sensor protection on the top of inv. Compressor

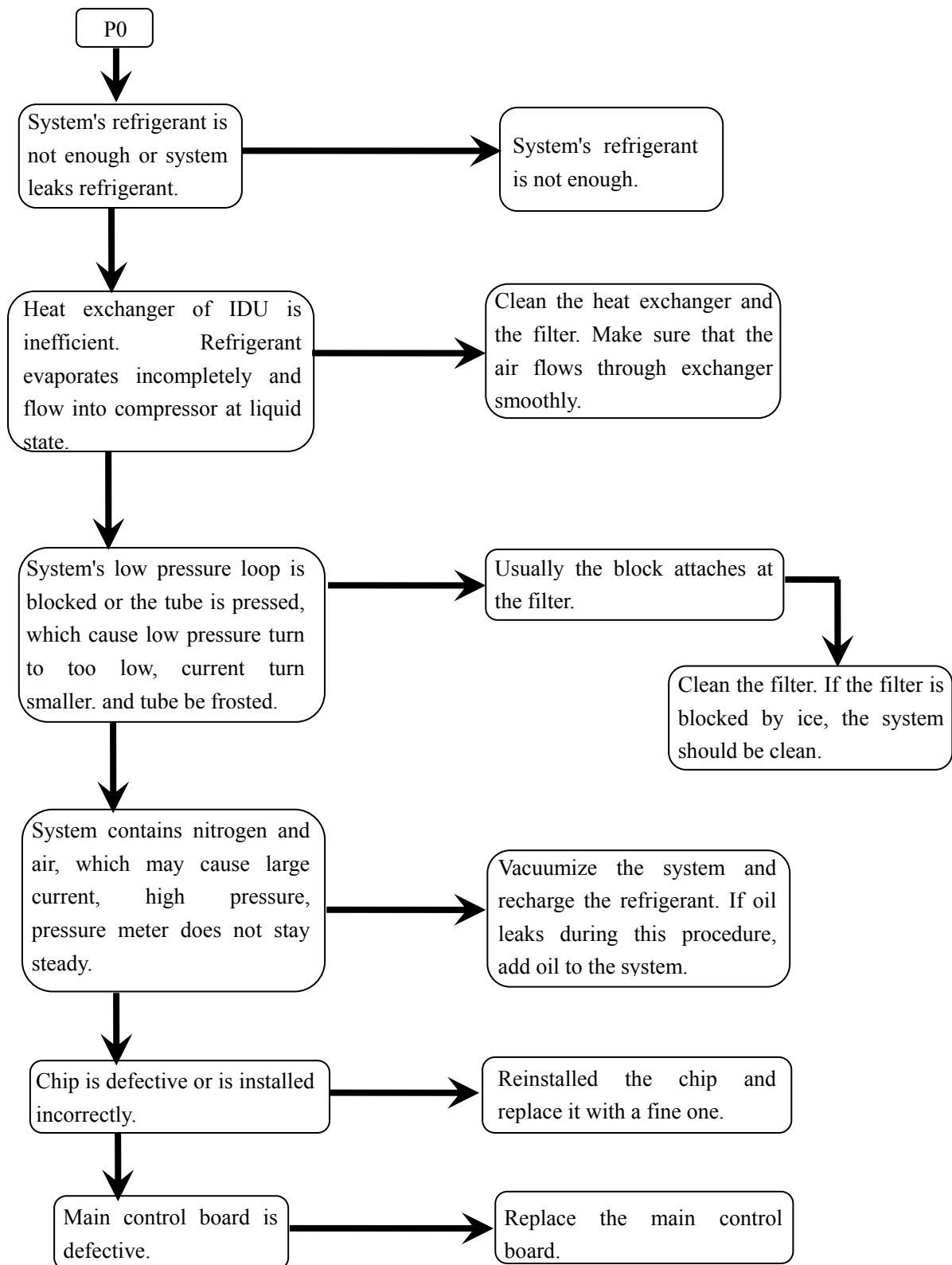
Outdoor Unit
Display

P0

Error One ODU displays P0 and changes to protecting standby state.
Explanation

Supposed 1. Refrigerant is not enough.
Causes 2. Efficiency of outdoor heat exchange is low.
3. Refrigerant does not loops smoothly
4. Control board is defective

Troubleshooting



Remarks: When system appear 3 times P0 or P4 protection in 100 minutes, system will auto shut down and display H6 malfunction, which can recover only by restarting the machine. At this time, malfunction should be promptly treated to avoid further damage.

3.15 "P1": High pressure protection

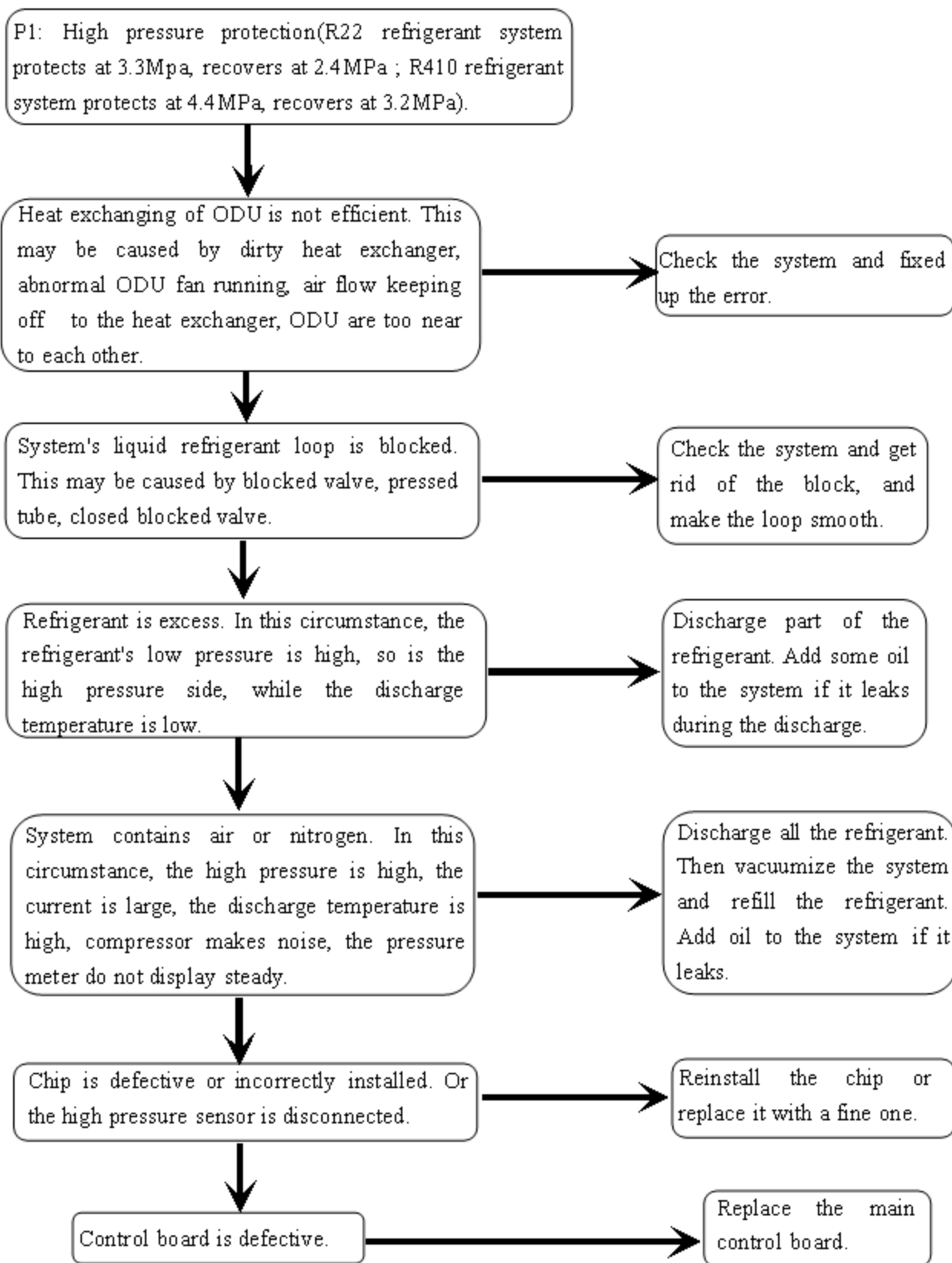
Outdoor Unit
Display

P1

Error	One ODU displays P1 and changes to protecting standby state.
Explanation	

Supposed	1. Refrigerant is excess.
Causes	2. Refrigerant does not loop smoothly.
	3. The refrigerant loop contains air.
	4. Control board is defective.

Troubleshooting



3.16 "P2": Low pressure protection

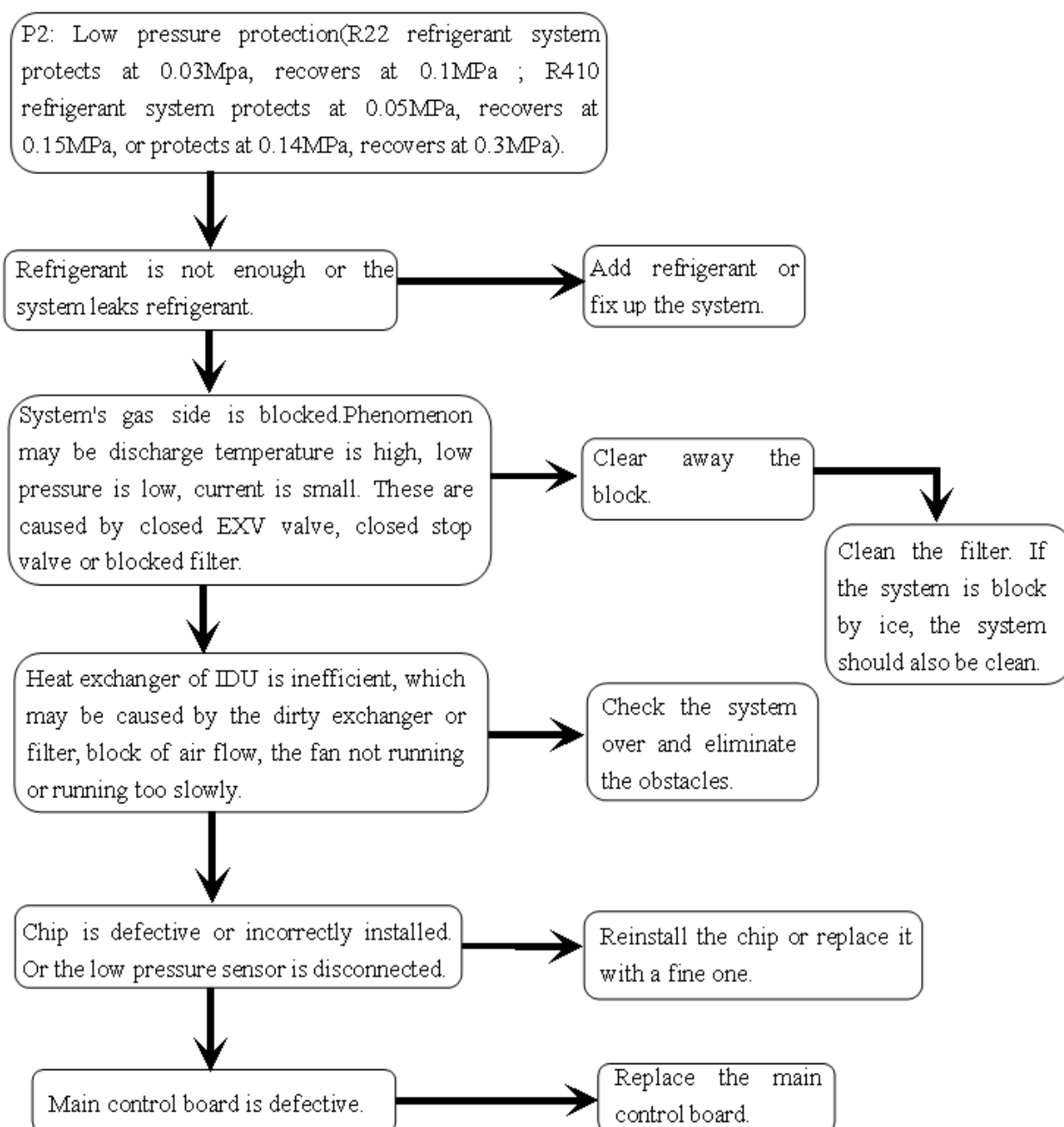
Outdoor Unit
Display

P2

Error	One ODU displays P2 and changes to protecting standby state.
Explanation	

Supposed	1. Refrigerant is not enough.
Causes	2. Refrigerant does not loop smoothly.
	3. Efficiency of indoor heat exchange is low.
	4. Control board is not defective.

Troubleshooting



Remarks: When system appear 3 times P2 protection in 30 minutes, system will auto shut down and display H5 malfunction, which can recover only by restarting the machine . Malfunction should be promptly treated to avoid further damage.

3.17 "P3": Inv. compressor over current protection

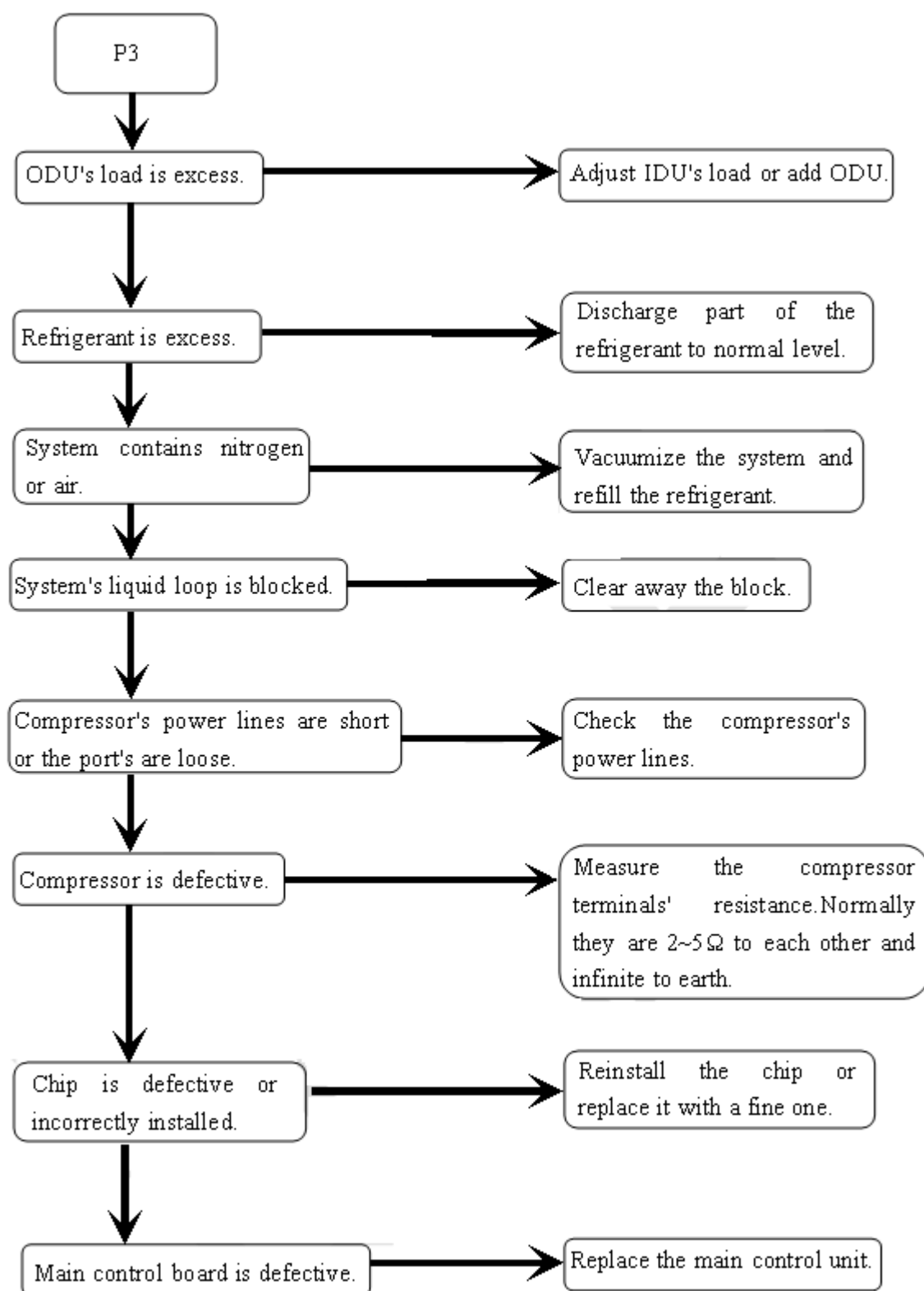
Outdoor Unit
Display

P3

Error ODU displays P3.
Explanation

Supposed	1. Load on ODU is excess.
Causes	2. Outdoor heat exchanging is not efficient.
	3. Refrigerant is excess.
	4. Compressor or its circuit is defective.
	5. Control board is defective.

Troubleshooting



3.18 "P4": Discharge temp. sensor protection

Outdoor Unit
Display

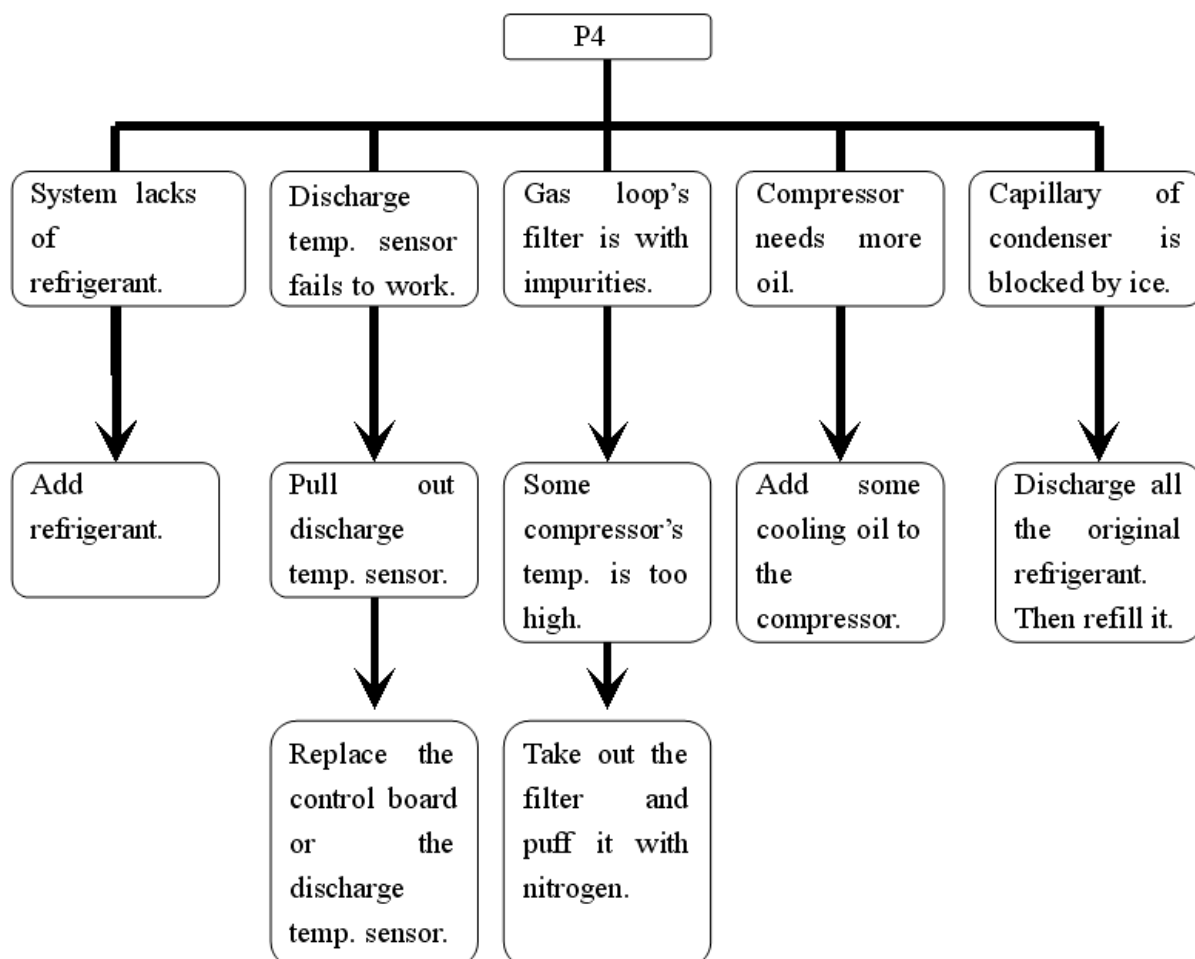
P4

Error One ODU displays P4 and changes to protecting standby state.
Explanation

Supposed Causes

1. Refrigerant is not enough.
2. Refrigerant does not loop smoothly.
3. Compressor needs more oil.
4. Control board is defective

Troubleshooting



3.19 "P5": Pipe temp. sensor protection

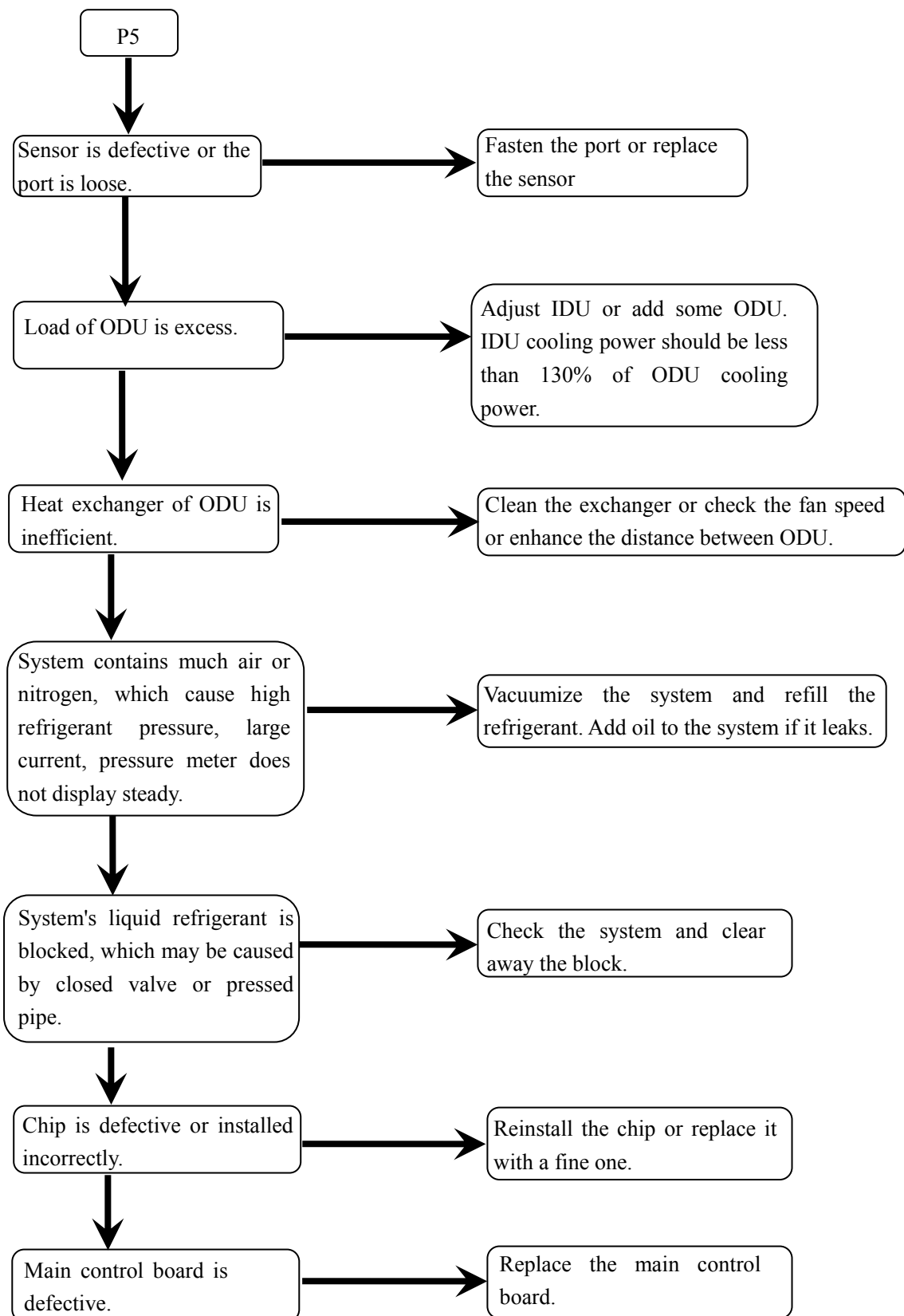
Outdoor Unit
Display

P5

Error	One ODU displays P4 and changes to protecting standby state.
Explanation	

Supposed	1. System's load is excess.
Causes	2. Heat exchanging is not efficient.
	3. Liquid refrigerant is blocked.
	4. Refrigerant is mixed with impurities.

Troubleshooting



3.20 "P6": Module protection

Outdoor Unit
Display

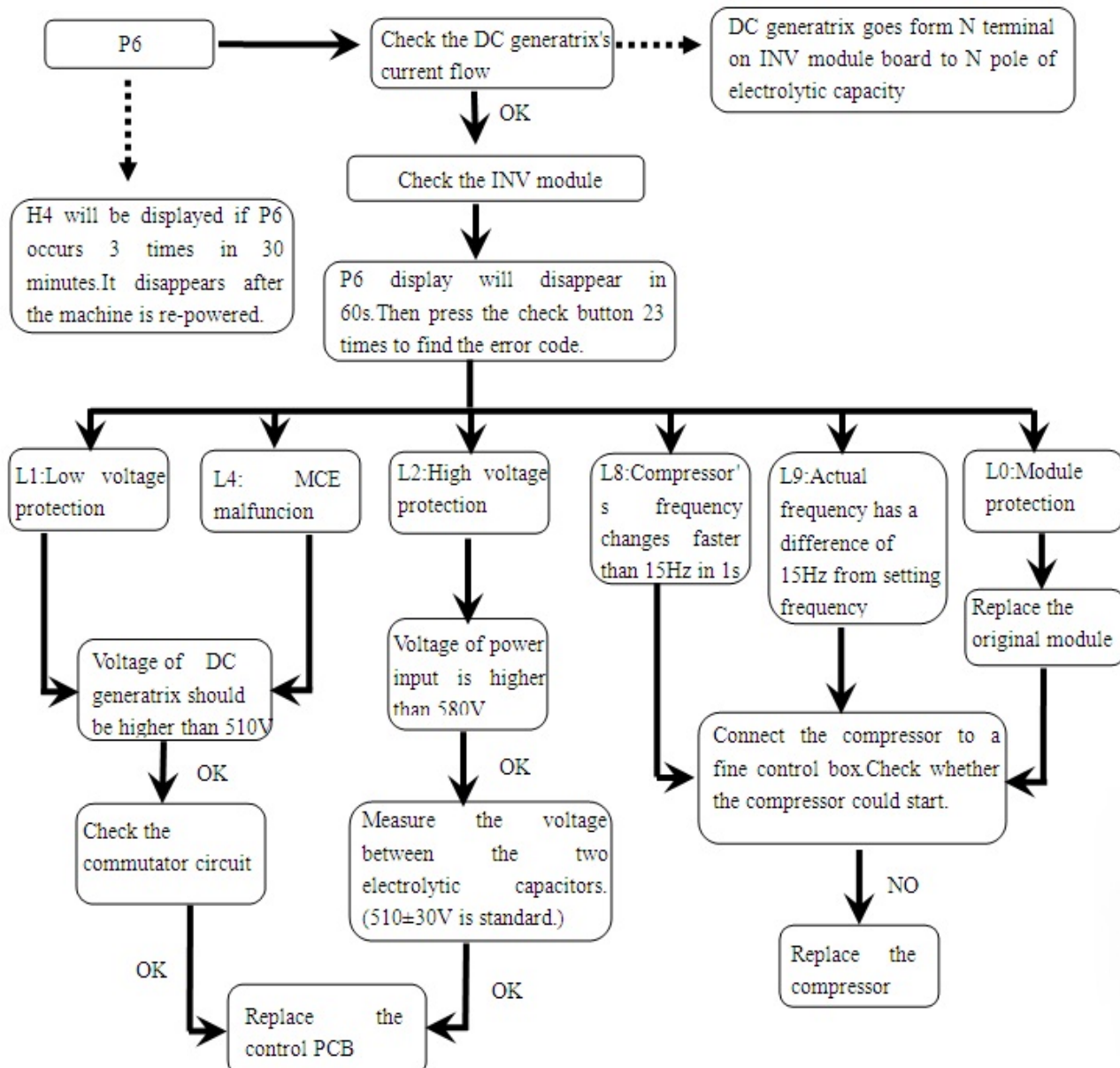
P6

Error ODU displays P6.
Explanation

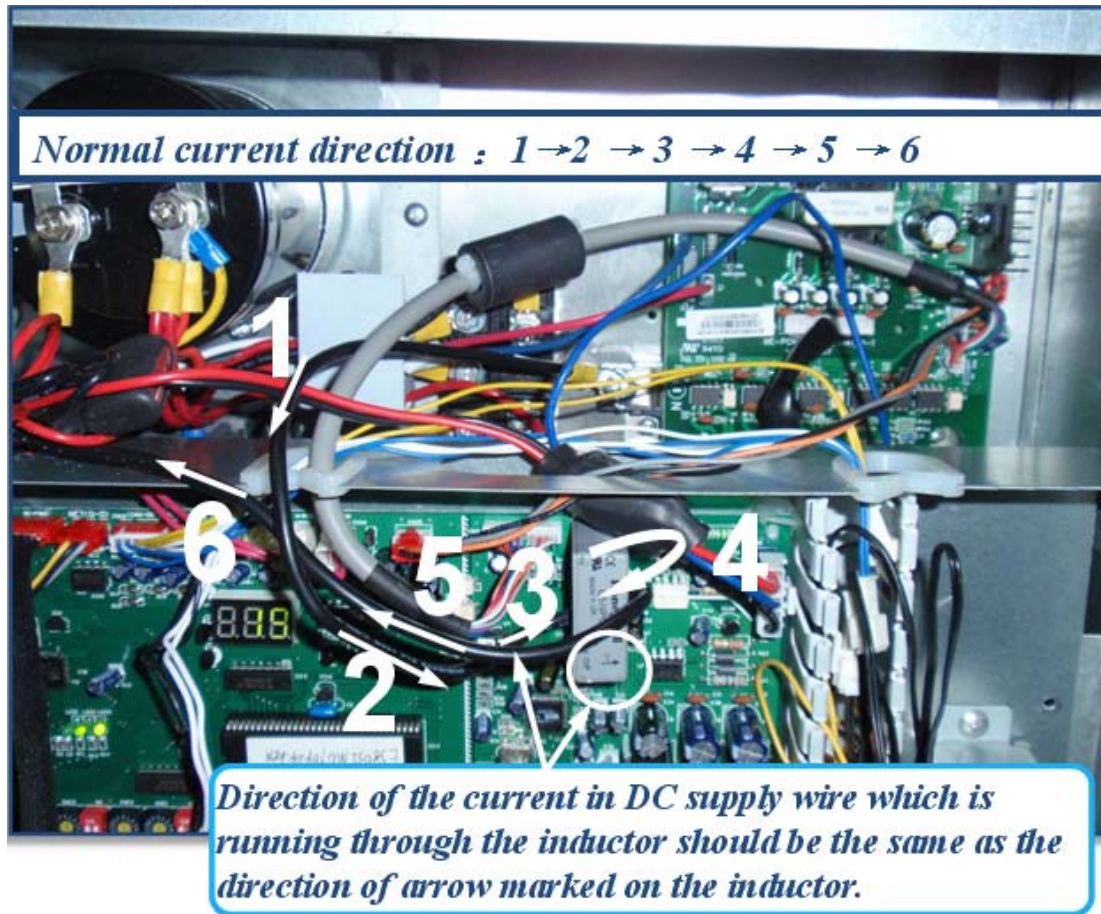
Supposed Causes

1. DC generatrix is not lined correctly.
2. DC generatrix low or high voltage protection.
3. MCE malfunction.
4. Compressor's frequency changes incorrectly.

Troubleshooting



1.1 DC generatrix detection



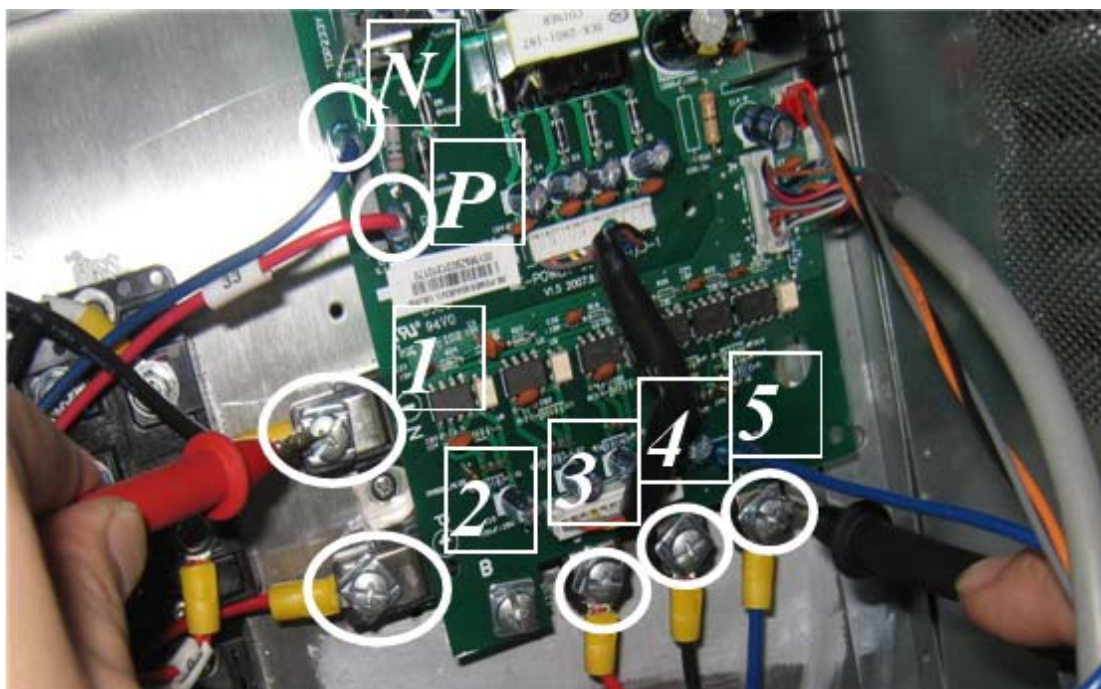
1.2 Voltage check of DC generatrix

1.2.1 Check the voltage of DC generatrix, which is normal between 510V and 580V. If less, go to next step.

1.2.2 Check the rectification circuit. Find out any loose in the circuit. Moreover check the filter board, rectifier stacks. Mind DC and AC switch on the meter while doing this.

1.2.3 If none of the above works, replace the main control board.

2 Voltage check of module



2.1 The voltage between N and P should be 1.41 times to local power supply.

2.2 The voltage between 1 and 2 should range from 510V to 580V

2.3 The resistance between 1,2,3,4,5 should be infinite. If any of them is about 0, which means the module has already been broken down, we need to replace the module.

3 Compressor's characteristics

3.1 Measure the resistance among the compressor's U, V, W respectively. The resistance should range from 0.9 to 5 Ohms and be the same.



Fig. A



Fig. B

3.2 Measure the resistance between the compressor's U, V, W and GND respectively. The resistance should be more or less mega-Ohms.

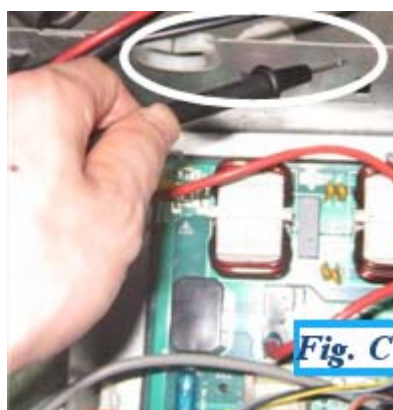


Fig. C



Fig. D

3.3 Measure the current of the compressor's U,V,W terminal respectively, which should be more or less the same, by e.g. current flow table clamp. They should be 4A at the frequency of 35 Hertz.

4 P6 appears after the compressor turns on with difficulties

4.1 Check the module according to step 3 first.

4.2 If the module works, make the machine standby for 4 hours with power supply, which can help heating the refrigerant and oil adequately.

4.3 Start the fixed frequency compressor only for 3S to 5S. The great startup pressure could wash the impurity away in the tube.

4.4 If the compressor's frequency climb to 37 Hertz or above in 2S after turning on, then there's something wrong with the compressor. Check the compressor.

4.5 If the compressor's current is normal, the malfunction appears on the control board. Please replace it.

5 The machine is powered on and P6 appears at once



In normal situation:

LED 1: Flash in 1Hz (slowly flash) when standby

LED 1: On when running

LED 2: Off

Phenomenon A

LED 2 red ON

LED 1 green Flashes 8 times and stops for 1S, then repeat.

Error: Inverter module failure

Phenomenon B

LED 2 red ON

LED 1 green Flashes 9 times and stops for 1S, then repeat.

Error: Low voltage protection

Here are 3 circumstances:

- a) The voltage between the two electrolytic capacitors is less than 450V. The AC contactor should be picked up. If not, there's something wrong with the main control board or the PTC resistors, which need to be replaced correspondingly.
- b) Somewhere is loose in the circuit.
- c) The voltage between P and N of CN12 on the main control board should range from 450V to 570V. If the voltage between N terminal and middle terminal of CN12 is 15V while error displays, it means that the main control board fails. Please replace the main control board.

Phenomenon C

LED 2 red ON

LED1 Green Flashes 10 times and stops for 1S, then repeat.

Error: High voltage protection

Here are 2 circumstances:

6. Three-phase power supply's voltage is more than 440V
7. Main control board fails. Please replace it.

3.21 "P7": Fixed 1 current protection

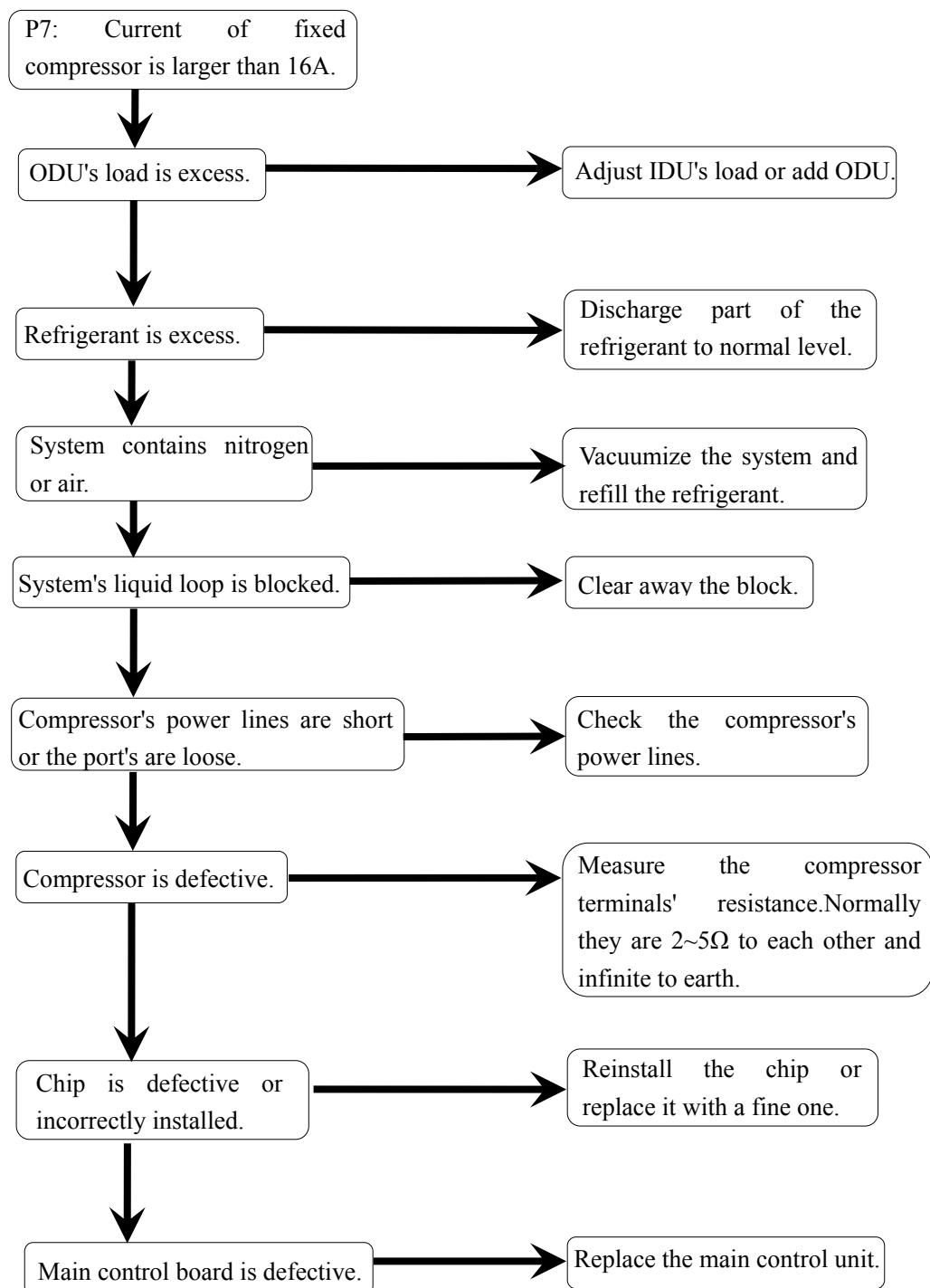
Outdoor Unit
Display

P7

Error	ODU displays P7.
Explanation	

Supposed	1. Load on ODU is excess.
Causes	2. Outdoor heat exchanging is not efficient.
	3. Refrigerant is excess.
	4. Compressor or its circuit is defective.
	5. Control board is defective.

Troubleshooting



3.22 "P9": Fan module protection

Outdoor Unit
Display

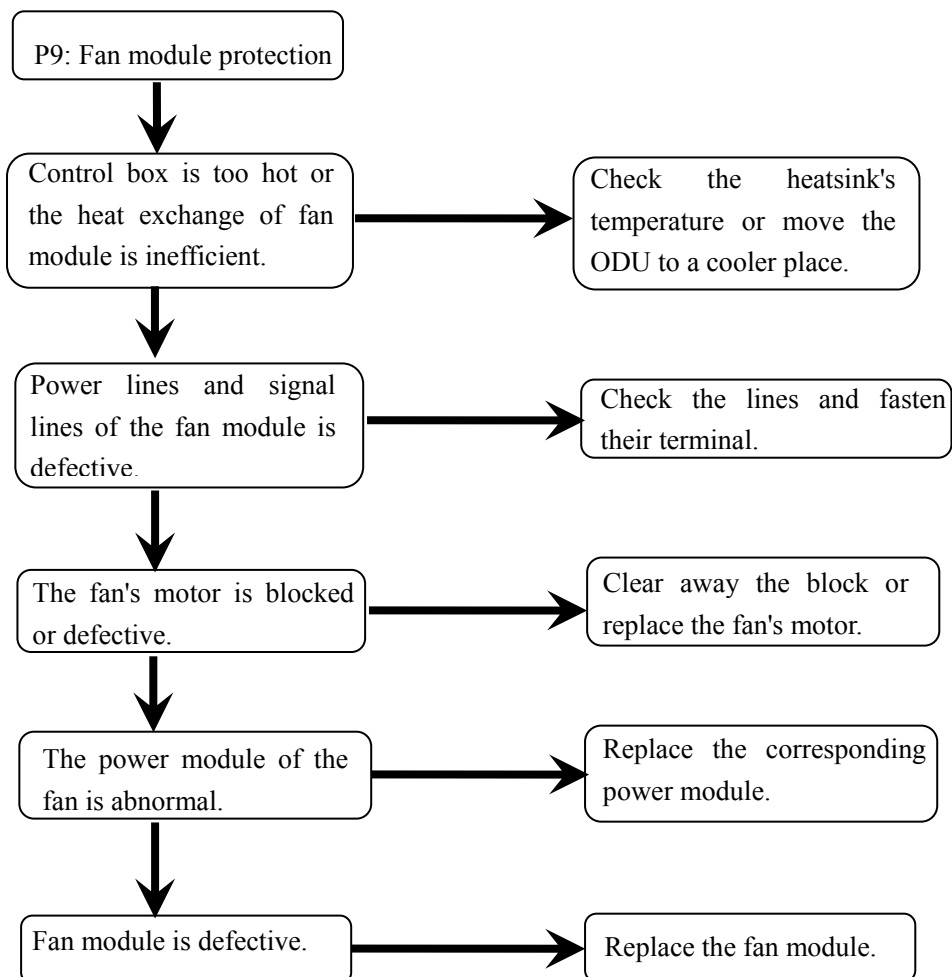
P9

Error ODU displays P9. Only V4+ series system would display this code.
Explanation

Supposed Causes

1. Control box is too hot.
2. Fan is blocked or is defective or is not powered correctly.
3. Signal line is loose.
4. Fan module is defective.

Troubleshooting



Remarks: If P9 occurs 3 times in 30 minutes, system will auto shut down and display H9 malfunction, which can recover only by restarting the machine. At this time, malfunction should be promptly treated to avoid further damage.

avoid further damage.

3.22 "P9": Fan module protection

Outdoor Unit
Display

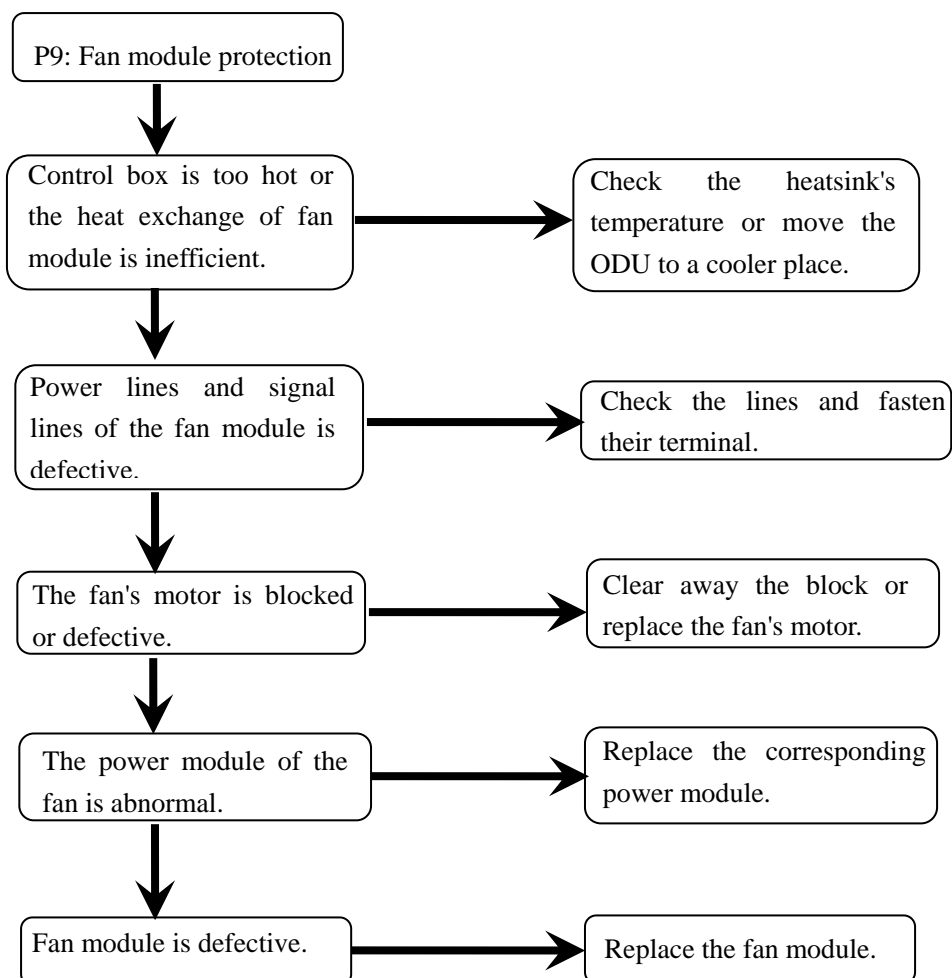
P9

Error ODU displays P9. Only V4+ series system would display this code.
Explanation

Supposed Causes

1. Control box is too hot.
2. Fan is blocked or is defective or is not powered correctly.
3. Signal line is loose.
4. Fan module is defective.

Troubleshooting



Remarks: If P9 occurs 3 times in 30 minutes, system will auto shut down and display H9 malfunction, which can recover only by restarting the machine. At this time, malfunction should be promptly treated to

avoid further damage.

Part 6

Electric and Control System

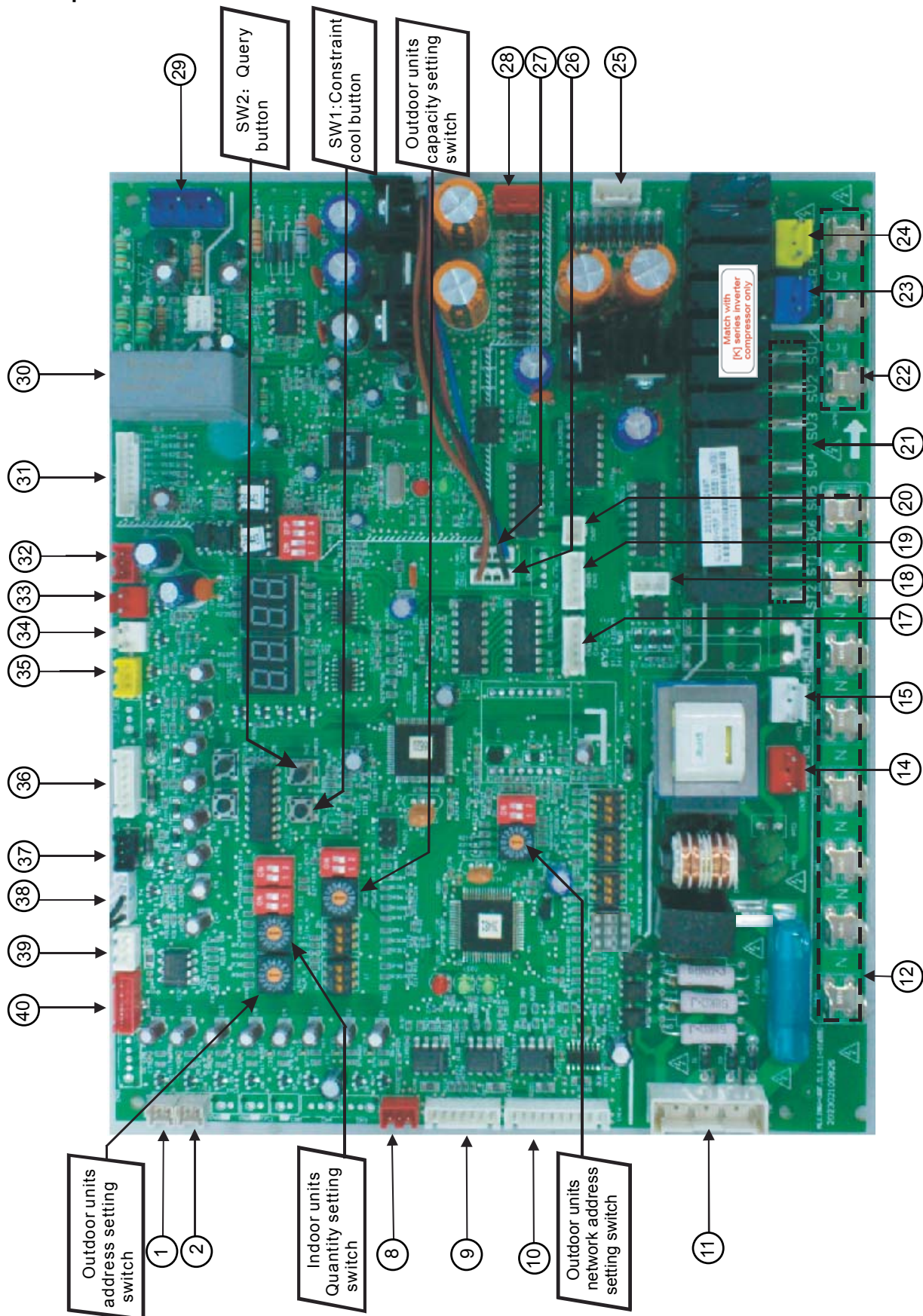
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1. Electric System

Wiring Diagrams and Field Wiring

Wiring diagrams and field wiring please refer to “6. Wiring Diagrams and field wiring” of “Part 2 Specification & Performance”

Description of Main Control Board of Outdoor unit

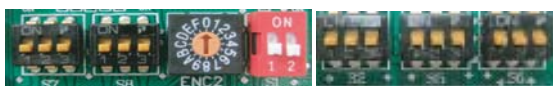


Dial codes definition

ENC1 ENC3 S12 S3



S7 S8 ENC2 S1 S2 S5 S6



ENC4 S10



SW5

**S1 definition**

Starting time is set about 5 minutes	Starting time is set about 12 minutes(Default)

S2 definition

Night time selection is 6h/10h(default)	Night time selection is 8h/10h	Night time selection is 6h/12h	Night time selection is 8h/12h

S3 definition

Night silent mode (default)	Silent mode	Super silent mode	None silent mode

S5 definition

Heating priority mode (default)	Cooling priority mode	Priority voting	Respond the heating mode only	Respond the cooling mode only

S6 definition

Automatic search address	Manual setting address. (Default the Factory Set)	Clear all the indoor unit address


S7,S8 and S10 definition

			Reserve
--	--	--	---------


ENC1:

	Outdoor unit address setting switch effective to 0-3 0 Stand for main unit 1-3 Stand for slave unit
--	---









ENC2:

	Outdoor units capacity setting switch Effective to 0-5 0Stand for 8HP 1---10HP;2---12HP;3---14HP;4---16HP;5---18HP
---	--



ENC4 definition

	Network address setting switch Effective to 0-F 0-F stand for 0-15
---	---

ENC3 and S12 definition

		Setting the numbers of indoor units to be 0-15
		Setting the numbers of indoor units to be 16-31
		Setting the numbers of indoor units to be 32-47
		Setting the numbers of indoor units to be 48-63

SW5 definition

	12HP Outdoor unit setting
	8.10.14.16.18HP outdoor unit setting

Explanation of main board

No.	Content	No.	Content
1	Discharge temp. sensed port of the Inv. compressor	25	Power output of the NO.1 transformer
2	Discharge temp. sensed port of the fix-1(8-10HP:Inv.)compressor	26	High-fan control port of AC fan
8	Power supply port in the mid-adapted panel	27	Low-fan control port of AC fan
9	Reserve	28	Power output of the NO.2 transformer
10	Wiring port for communication between indoor and outdoor units, indoor unit network, outdoor unit network and network accounting	29	Port for inverter module voltage inspection
11	Phase inspection port	30	Mutual inductor for DC main lead current
12	Null line port	31	Activation port of inverter module
14	Power input of the NO.1 transformer	32	Power supply connected port of the main control panel
15	Power input of the NO.1 transformer	33	ON/OFF single input for system low pressure inspection
17	EXV 1 driving port	34	ON/OFF single input for system high pressure inspection
18	Reserve	35	Input port for system high pressure inspection
19	EXV 2 driving port	36	Current inspection port of the inverter(fixed) compressors
20	Power supply port of 12V DC	37	Reserve
21	Loading output terminal	38	Inspection port for outdoor ambient temp. and condenser coil
22	Loading output terminal	39	Communication ports among outdoor units
23	Loading output terminal	40	Control port of DC fan A
24	Loading output terminal	--	---

1.3 SW2 Query Instruction**System parameter****SW2:**

(CHECK)——Used to query outdoor unit data. Check point sequence and corresponding actuality is as follows:

No.	Display code	Display content	Note	No.	Display code	Display content	Remark
1	0--	Address of outdoor unit	0,1,2,3	17	16--	Tp saturation temp	Actual value+30
2	1--	Capacity of outdoor unit	8,10,12,14,16,18	18	17--	Current of inverter compressor	Actual value
3	2--	Qty .of Modular outdoor unit	Setting on main unit	19	18--	Current of fixed compressor	Actual value
4.	3--	Setting of indoor units	Setting on main unit	20	19--	Opening angle of EXV-1	Actual value ÷ 8
5	4--	Total cap. of outdoor unit	Setting on main unit	21	20--	Opening angle of EXV-2	Actual value ÷ 8
6	5--	Total requirement of indoor unit	Available for main unit	22	21--	High pressure	Actual value × 10
7	6--	Total requirement of main unit corrected capacity	Available for main unit	23	22--	Qty. of indoor unit	If no, display 00
8	7--	Operation mode	0,2,3,4	24	23--	Qty. of operating indoor units	
9	8--	This outdoor units actual operation capacity	Capacity requirement	25	24--	Priority mode	
10	9--	Speed of fan 1	Actual value	26	25--	Noise control mode	0,1,2,3
11	10--	Speed of fan 2	Actual value	27	26--	Reserve	

12	11--	T2/T2B average Temp	Actual value	28	27--	DC Voltage	
13	12--	T3 Pipe	Actual value	29	28--	Reserve	
14	13--	T4 ambient temp	Actual value	30	----	The last error or protection code	Without error/protection display8.8.8
15	14--	Discharge Temp. of Inverter Compressor	Actual value	31	----	--	Check end
16	15--	Discharge Temp. of fixed compressor	Actual value				

Note: When operation of system lasts 1 hour and stays stability, press checkup button on PCB of outdoor master unit, query one by one and fill out the above table according to facts.

Description of display:

Operation mode: 0---Turn off; 2---Cooling; 3---Heating; 4---Constraint cooling

Fan speed: 0——OFF; 1~15——Speed increasing sequentially; 15——is the max. fan level.

PMV opening angle: pulse count = display value x 8.

Noise control mode: 0—Night silent mode; 1——Silent mode; 2——super silent mode; 3——no priority

Priority mode: 0——heating priority mode; 1——cooling priority mode; 2——opening the priority mode; 3——response the heating mode only; 4——response the cooling mode only.

SW1: Constrain cool button

SW2: Query switch

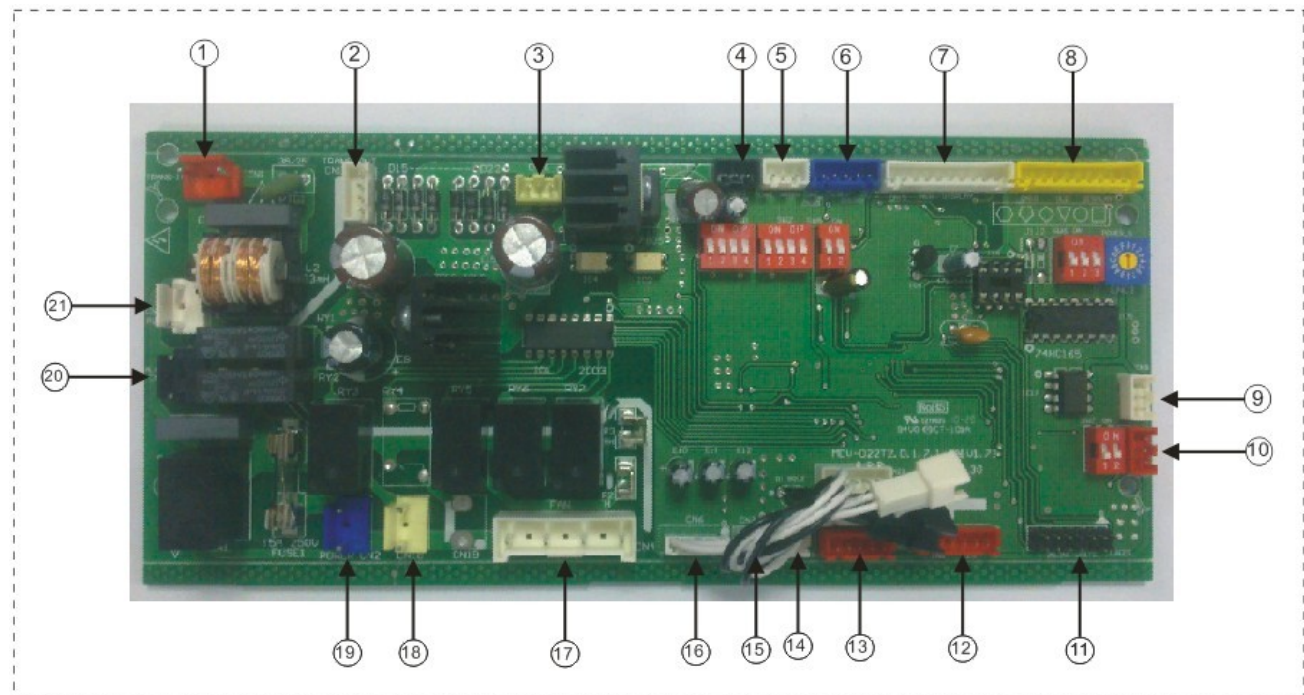
ENC1: Outdoor units address setting switch. ENC2: Outdoor units capacity setting switch. ENC3: Indoor units Qty. Setting switch.

ENC4: Network address setting switch.

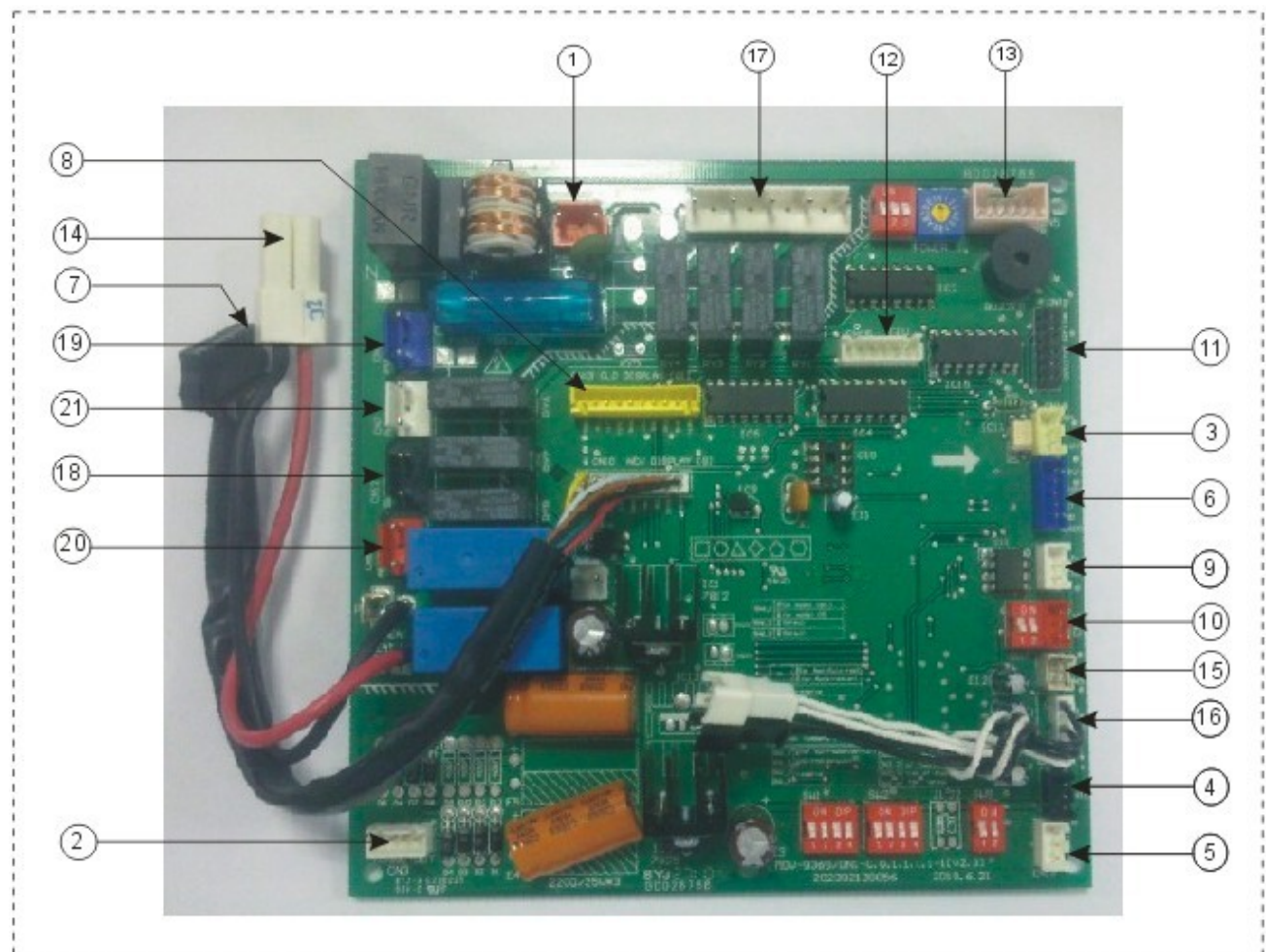
Normal display: when in standby mode, it indicates number of indoor units, when running, it indicates output percentage value of compressor.

1.4 Description of Main Control Board of Indoor unit

There are two shapes of main control board that used to all types of indoor unit matching with V4+ outdoor unit.





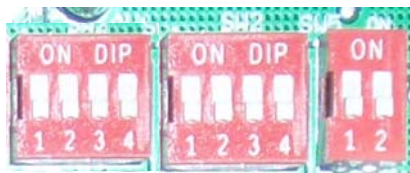
Shape 1









Shape 2









Dial codes definition**0/1 definition**

ON 	Means 0
ON 	Means 1





SW1**SW2****SW5****J1-J2****SW6****SW7****SW1 definition**

ON 	1 means factory test mode 0 means default auto addressing mode	ON 	1 means DC fan is chosen 0 means AC fan is chosen
ON 	00 means DC fan static pressure is 0 (reserved)	ON 	01 means DC fan static pressure is 1 (reserved)
ON 	10 means DC fan static pressure is 2 (reserved)	ON 	11 means DC fan static pressure is 3 (reserved)




SW2 definition

ON 	00 means shutting down the unit to stop cold air at 15°C	ON 	01 means shutting down the unit to stop cold air at 20°C
ON 	10 means shutting down the unit to stop cold air at 24°C	ON 	11 means shutting down the unit to stop cold air at 26°C
ON 	00 means the time of stopping fan (when no capacity need) is 4 minutes	ON 	01 means the time of stopping fan (when no capacity need) is 8 minutes
ON 	10 means the time of stopping fan (when no capacity need) is 12 minutes	ON 	11 means the time of stopping fan (when no capacity need) is 16 minutes

SW5 definition

ON 	00 means temperature compensation value is 6°C under heating mode	ON 	01 means temperature compensation value is 2°C under heating mode
ON 	10 means temperature compensation value is 4°C under heating mode	ON 	11 means temperature compensation value is 8°C under heating mode




SW6 definition

ON 	1 means old display panel 0 means new display panel	ON 	1 means auto air blow under auto mode 0 means auto air blow under non-auto mode
ON 	reserved		

SW7 definition

	Normal configuration		Last unit of the network
---	----------------------	---	--------------------------

J1 J2 definition

	Without jumper J1 for auto restart function		With jumper J1 for non-auto restart function
	reserved		

Explanation of main board

No.	Content	No.	Content
1	Power input of transformer	12	Electric expansion valve drive port
2	Power output of transformer	13	Swing motor drive ports
3	Port for remote ON/OFF switch	14	Port for electric auxiliary heater
4	Port for infrared sensor	15	Indoor evaporator outlet pipe temp. detect port
5	Water level switch	16	Indoor ambient and evaporator middle part temp. detect port
6	Port for network module	17	Port for indoor fan motor
7	Port for new display board	18	Reserved
8	Port for old display board	19	Power input port
9	Communication port of X Y E	20	Port for alarm
10	Communication port of P Q E	21	Port for water pump
11	Port for on-line writing program	—	

Error code & indication

Error	LED Light show	Digital display
Without address when first time power on	Time LED and run LED flash together	FE
M_Home non-matching	4 LED flash together	H0
Modes conflict	Defrost LED flashes	E0
Communicative error between indoor and outdoor units	Timer LED flashes	E1
Temperature sensor T1 error	Run LED flashes	E2
Temperature sensor T2 error	Run LED flashes	E3
Temperature sensor T2B error	Run LED flashes	E4
EEPROM error	Defrost LED flash slowly	E7
Outdoor unit error	Alarm LED flashes slowly	Ed
Water level alarm	Alarm LED flash	EE

Auto Addressing

- 1) Auto-Addressing is an indoor-address distributed method which will automatically done by outdoor unit, without manual addressing. When the unit is under testing, as the outdoor and indoor units are powered on simultaneously, the outdoor unit will automatically distribute different address to every indoor unit in less than 10 minutes.
- 2) With regarding to the customer's desire of some kind fixed address or regular addresses for all indoor units, it can be achieved by wireless remote controller.

1.5 Electric Wiring Installations

1.5.1 Highlights of electrical installation

- 1) Please separately design the special power of indoor units and outdoor units.
- 2) The power adopts special circuit, and installs creepage protector and manual switch.
- 3) The indoor units' power, creepage protector and manual switch connecting to the same outdoor unit must be general. All indoor units must be the same circuit, and must simultaneously on or off; otherwise, system life will seriously effect, and appear the situation not to solve.
- 4) The communication line between indoor units and outdoor units please use 3 core shielded wiring, while don't use the multi core wiring without shielded affect, for the interference is reduced each other
- 5) Purchased wiring, parts and materials should be in compliance with the local and national regulations.
- 6) All field wiring construction should be finished by qualified electrician.
- 7) Air conditioning equipment should be grounded according to the relevant local and national electrical regulations.
- 8) Current leakage protection switch should be installed (select current leakage breaker in light of the 1.5-2 times of total loading rated current.)
- 9) When connecting wiring and wire holder, use cable clamp to fix and make sure no exposure.
- 10) Refrigerant piping system and wiring system of indoor and outdoor unit belongs to the different system.
- 11) Do not connect the power wire to the terminal of signal wire.
- 12) When power wire is parallel with signal wire, put wires to their own wire tube and remain proper gap (the current capacity of power wire is: 10A below 300mm, 50A below 500mm).
- 13) Voltage discrepancy of power wire terminal (side of power transformer) and end voltage (side of unit) should be less than 2%. If its length could not be shortened, thicken the power wire. Voltage discrepancy between phases shall not pass 2% rated value and Current discrepancy between highest and lowest phase should be less than 3% rated value.

1.5.2 Selection of wiring

1. The selection of wiring area shall in accordance with the requirements below:

- 1) Voltage lose of wire shall meet the requirement of terminal voltage for normal operation and startup.
- 2) The wiring current-carrying capacity determined by installed method and environment is not less than the largest current of unit.
- 3) Conductor shall ensure the stability of movement and heating.
- 4) The conductor's smallest sectional area should satisfy the requirement of mechanical strength.

When earth protection line (shortly called PE line) is made of material the same as phase line, the smallest sectional area of PE line should be in accordance with the regulation below:

Sectional area of core to phase line s(mm ²)	Smallest sectional area of PE line(mm ²)
$S \leq 16$	S
$16 < S \leq 35$	16
$S > 35$	S/2

1.5.3 Distribution highlights of distribution wiring

1. When distributing wiring, select wirings with different colors for phase line, zero line and protection earth according to relevant regulations.
2. The power wire and control wire of concealed engineering is prohibited to bind together with refrigerant piping. It is necessary to pass through wire tube and be distributed separately, and the gap between control line and power wire should be 500mm at least.
3. When distributing wiring by passing through pipe, the following should be paid attention to:
 - 1) Metal wire tube could be used in indoor and outdoor, but it is not suitable to the place with acid – alkali

corrosion.

2) Plastic wire tube is generally used in indoor and place with corrosion, but it is not suitable to situation with mechanical damage.

3) The wiring through pipe shall not be in the form with ends jointing. If there must be joint, connection box should be installed at the corresponding place.

4) The wiring with different voltage should not pass through the same wire tube.

5) Total sectional area of wiring through wire tube shall not exceed 40% valid area of stuffing tube.

6) Fixing point of wire tube support shall follow the standard below:

Normal diameter of wire tube	Largest gap between fixed points of wire tube	
Mm	Metal pipe	Plastic pipe
15~20	1.5m	1m
25~32	2m	1.5m
40~50	2.5m	2m

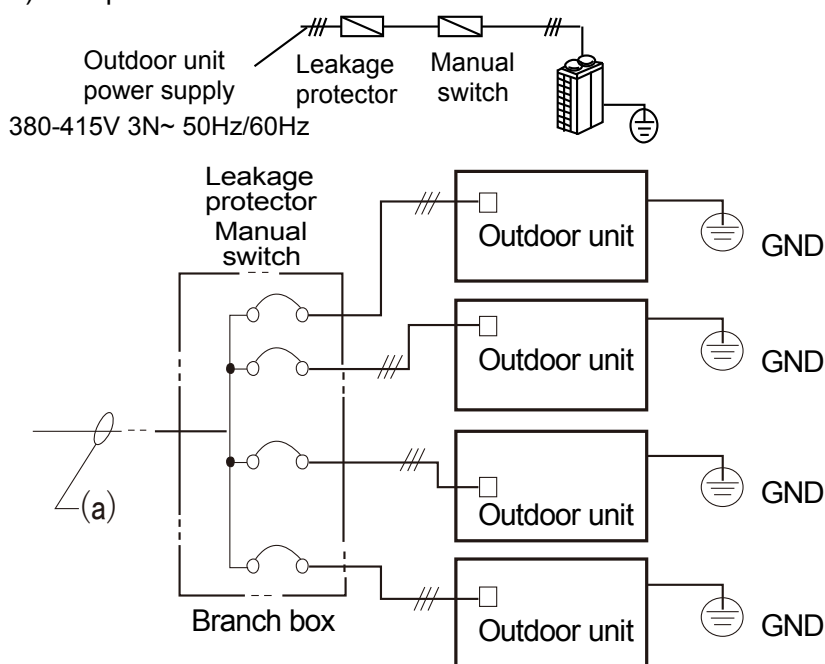
1.5.4 Outdoor unit power wiring selection

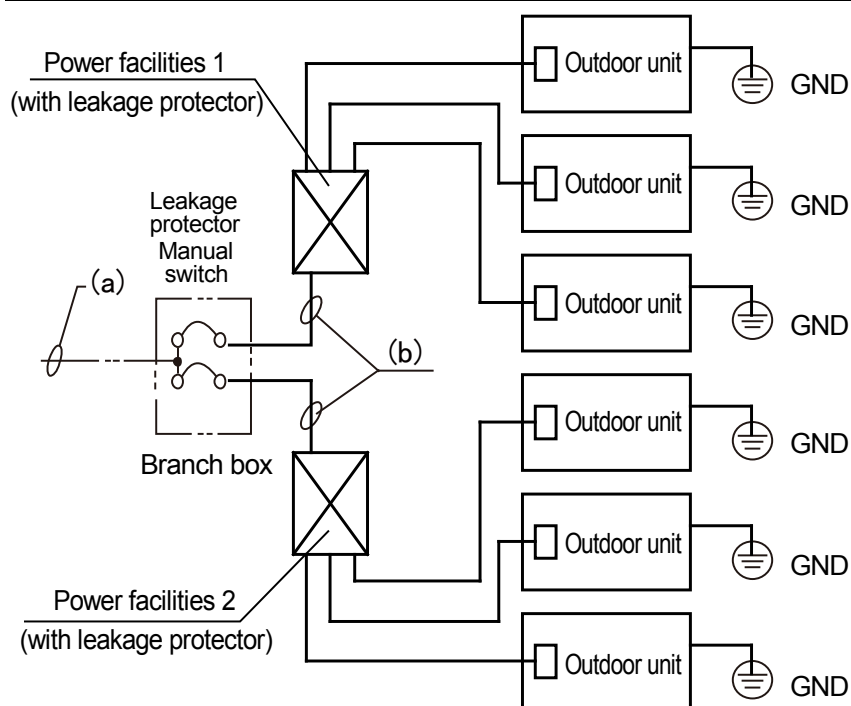
1) Separate Power Supply without power facility.

Model	Power	The shortest wiring dia. (mm)			Manual switch (A)		Creepage protector
		≤20m	≤50m	GND	Capacity	Fuse	
MDV-252(8)W/DRN1(C)	380~415V 3N~ 50Hz	4×10	4×16	10	32	25	<100mA, 0.1sec
MDV-280(10)W/DRN1(C)		4×10	4×16	10	32	25	<100mA, 0.1sec
MDV-335(12)W/DRN1(C)		4×10	4×16	10	50	40	<100mA, 0.1sec
MDV-400(14)W/DRN1(C)		4×16	4×25	16	50	40	<100mA, 0.1sec
MDV-450(16)W/DRN1(C)		4×16	4×25	16	63	50	<100mA, 0.1sec

Note: The length in the table equals the value of power cord connecting outdoor units, indicating the condition that the voltage dropping range is within 2%. If the length exceeds the above figure, please select the wire diameter according to relevant standard.

2) With power facilities.





2.1) Select the wire diameter, refer to the following table.

(\geq)(unit :mm²)

Outdoor unit capacity	< 20M	< 50M	Outdoor unit capacity	< 20M	< 50M	Outdoor unit capacity	< 20M	< 50M
8	10	16	28	25	35	48	50	70
10	10	16	30	35	50	50	70	95
12	10	16	32	35	50	52	70	95
14	16	25	34	35	50	54	70	95
16	16	25	36	35	50	56	90	110
18	16	25	38	35	50	58	90	110
20	16	25	40	35	50	60	90	110
22	16	25	42	50	70	62	90	110
24	25	35	44	50	70	64	90	110
26	25	35	46	50	70		—	—

Power wiring refers to the main wire (a) connecting to branch box and the wiring (b) between branch box and power facilities. Please select the wire diameter according to the following requirement.

Diameter of main wire (a): Depends on the total horsepower of outdoor unit and the above table.

E.g. In system : (8Hp×1unit+8Hp×1unit+10Hp×1unit), total Hp=26Hp→ refer to the above table →size of wire=35 mm²(within 50m)

Diameter of wiring (b): between branch box and power equipment. Depend on the total horsepower of downward outdoor unit and the above table.

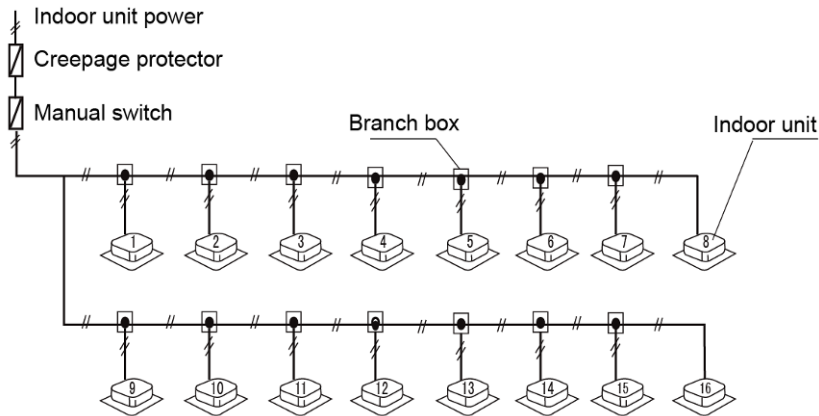
E.g. In system : (8Hp×1unit+8Hp×1unit+10Hp×1unit), total Hp=26Hp→refer to the above table→size of wire=35mm²(within 50m)

2.2) Select the capacity of manual switch and fuse of the branch box. Depend on the total horsepower.

Total capacity(HP)	Manual switch(A)	Fuse(A)	Total capacity(HP)	Manual switch(A)	Fuse(A)
--------------------	------------------	---------	--------------------	------------------	---------

8~10	32	25	36~40	110	90
12~14	50	40	42~44	125	100
16~18	63	50	46~50	150	125
20~22	80	63	52~60	200	150
24~28	90	70	62~72	250	200
30~34	100	80	--	--	--

1.5.5 Indoor unit power wiring selection



Note:

- 1) Set refrigerant piping system, signal wires between indoor-indoor unit, and that between outdoor-outdoor units into one system.
- 2) Please do not put the signal wire and power wire in the same wire tube; keep distance between the two tubes. (Current capacity of power supply: less than 10A--300mm, less than 50A--500mm.)
- 3) Make sure to set address of outdoor unit in case of parallel multi-outdoor units.

2. Control System

2.1 Control System Introduction

2.1.1 Connecting highlights of control line (RS-485 communication)

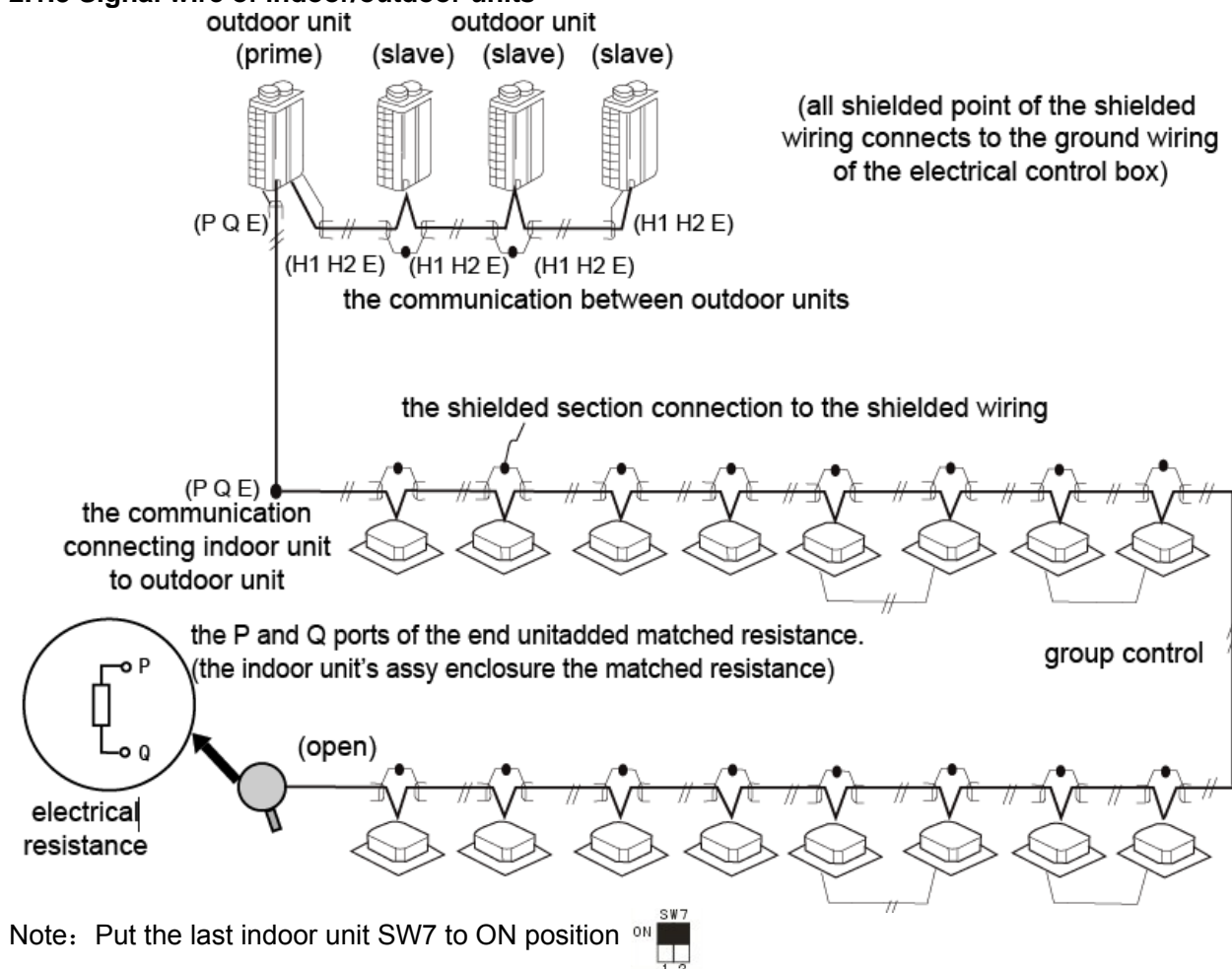
1. The control line should be shielded wire. Using other wiring shall create signal interference, thus leading to error operation.
2. The shielded nets at the two sides of shielded wires are either grounded to the earth, or connected with each other and jointed to the sheet metal along to the earth.
3. Control wire could not be bound together with refrigerant pipeline and power wire. When power wire and control wire is distributed in parallel form, keep gap between them above 300mm so as to preventing signal interference.
4. Control wire could not form closed loop.
5. Control wire has polarity, so be careful when connecting.

2.1.2 Selection of control wire specification

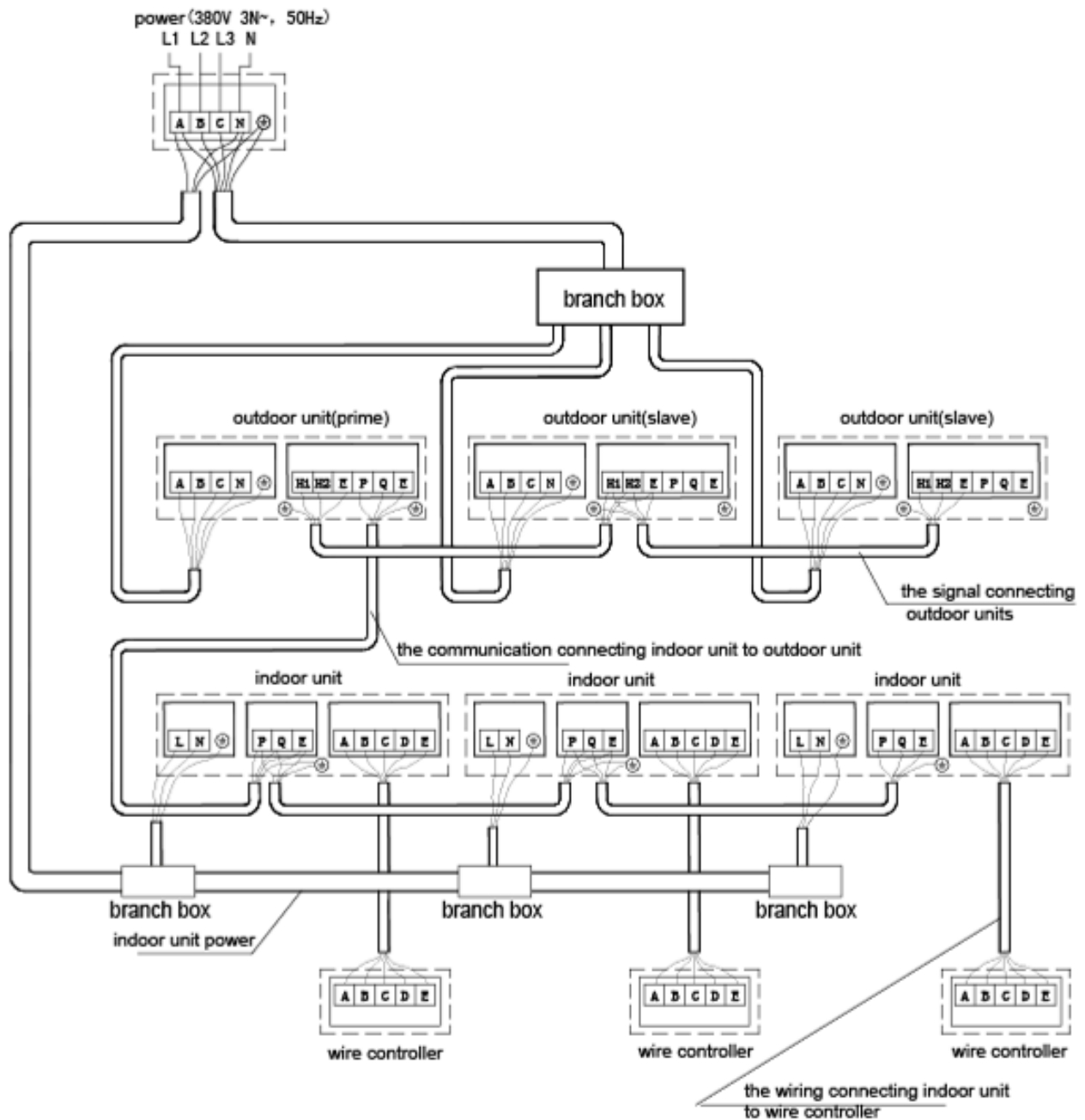
The ordinary shielded wire includes:

Model	Name
AVP	Copper core PVC insulation shielded wire
AVP-105	Heat-resistant 105℃ PVC insulation shielded wire
RVP	PVC insulation shielded flexible wire
RVP-105	Heat-resistant 105℃ PVC insulation shielded flexible wire
RVVP	PVC insulation shielded PVC sheath flexible wire
RVVP1	PVC insulation entangled shielded PVC sheath flexible wire

2.1.3 Signal wire of indoor/outdoor units



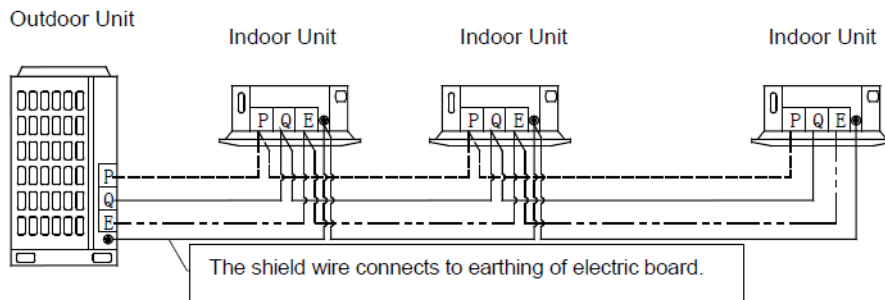
E.g. refer to the following example.



Note:

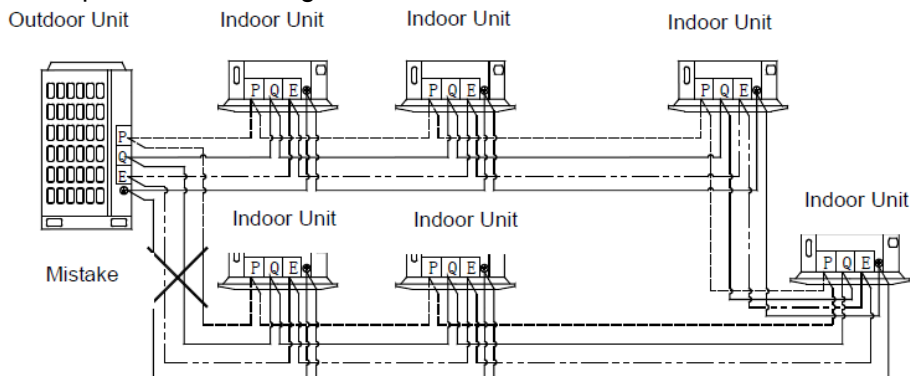
1. The signal connecting line between outdoor units, indoor and outdoor units and indoor units has polarity. When connecting, be careful to prevent error connection.
2. Signal wire shall adopt three-core shielded wire with the dia. no less than 0.75mm^2 .
3. The signal wire of indoor unit and outdoor unit must only connect to the prime outdoor unit.
4. Do not bind signal wire and copper pipe together with belting.

1) Correct connection



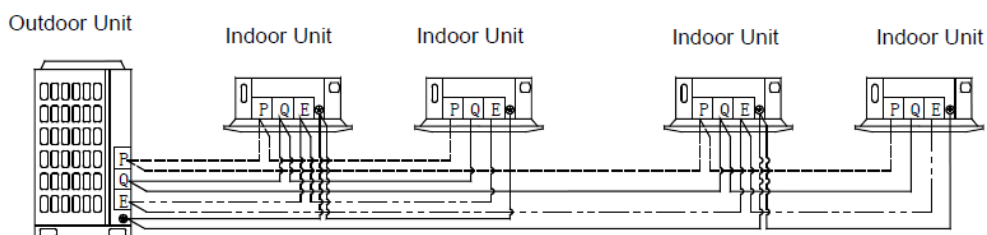
2) Typical wrong connection

a. Loop connection of signal wire

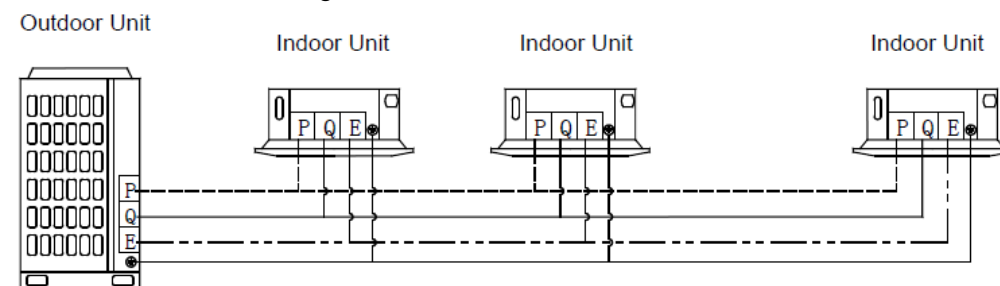


b. Star connection of signal wire

• Star connection of part signal wires

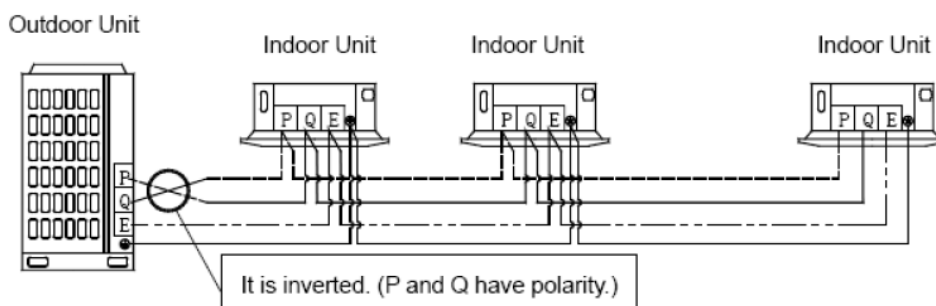


• Star connection of all signal wires

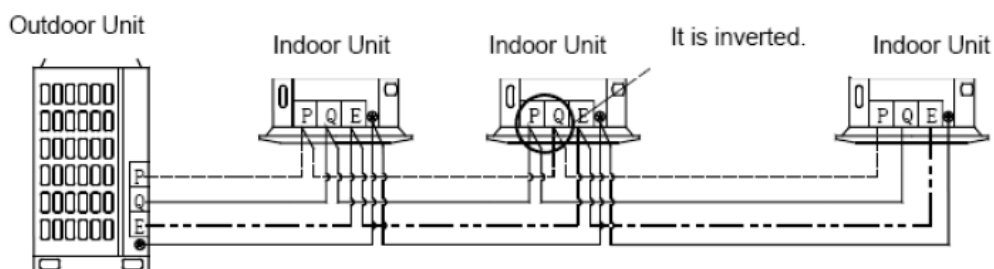


c. Reverse connection of signal wire

• Outdoor unit — indoor unit



• Indoor unit — indoor unit

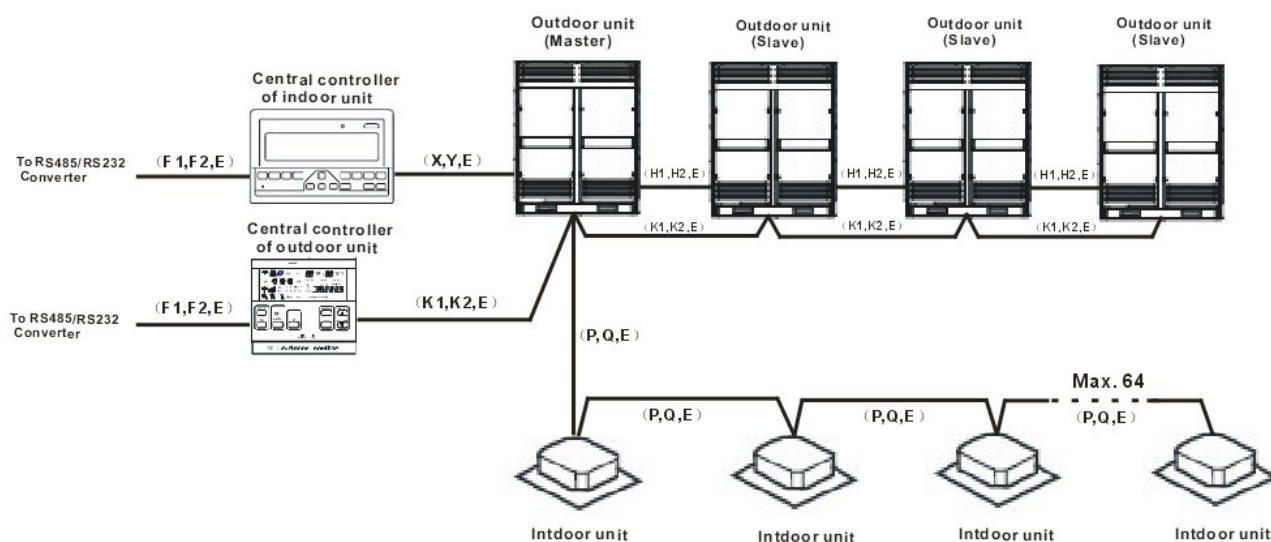


Caution: shielded layer should be connected to electrical panel.

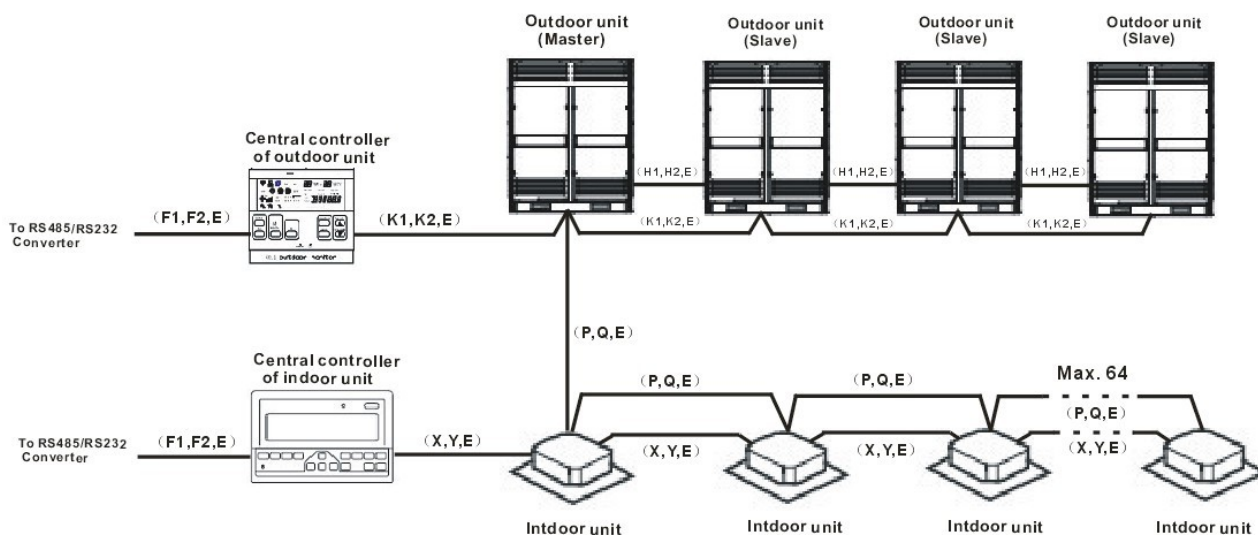
2.1.4 Signal wire of centralized control

When centralized control is needed, one CCM03 (central controller of indoor unit) can only control the indoor units which are in the same refrigerant system **via the port X Y E of outdoor unit**. Outdoor unit will automatically distribute the address to indoor units without any manual setting. Remote controller can enquiry and modify every indoor unit address.












The diagram below shows the connection of signal wire in this case:












Besides, CCM03 can also connect indoor units **via the port X Y E of indoor unit**. However, one more group of wire(X Y E between indoor units) is needed; it is more complex and not suggested. Anyway, the diagram below shows the connection of signal wire in this case:







2.1.5 Controller introduction

Controller and assy.	Appearance	Model	Description
Wireless remote controller		R51C/BGE	More the following functions than general wireless remote controller: add water, add humid, exchange air, fresh air, and etc.
		R51I4/BGE	General functions with backlight and FOLLOW ME.
		R51D/E	General functions.
		R51/E	General functions and without economic mode.
		R05/BGE	Big screen and LCD display, with back light display, clock function.
		R06/BGE	The function is the same as R05/BGE, and only the appearance is different.
		R06/BGCE	For cooling only mode. The function is the same as R05/BGE, and only the appearance is different.
		RM05/BG(T)E-A	General remote functions with address setting function,
Wired controller		KJR-10B/DP(T)-E	Connection needs that the indoor unit display panel contains a corresponding port.
		KJR-10B/DPC(T)-E	The function is generally the same as the KJR-10B/DP(T)-E, but excluding the heat mode.
		KJR-12B/DP(T)-E	This controller integrate FOLLOW ME function, others is the same with KJR-10B/DP(T)-E.
		KJR-12B/DPBG(T)-E	Based on the KJR-12B/DP(T)-E and designed with backlight.
		KJR-90A	All basic function is the same as KJR-10B/DP(T)-E.
		KJR-90A1-E	To avoid mode confliction running mode is fixed to cool mode, other functions are the same as KJR-90A.
Central control monitor		MD-CCM03/E (M)	2nd generation central control monitor of indoor unit. Add mode lock, big screen appearance, blue back light display, and mode memory function based on MD-CCM01/E.
		MD-CCM09/E	The weekly central controller of indoor unit. Control Max. 64 indoor units and possess week schedule function, but cannot connect network control system.
		KJR-90B/M	New general controller of indoor unit. It is only switch, which cannot change special mode, but it can simultaneously switch max. 16 indoor units.
		MD-CCM02/E	The central control monitor of outdoor unit. Monitor max. 32 outdoor units.

		KJRF-180A/MBT-E	Be able to control up to 16 indoor units and a water heater, including one fresh air unit.
		KJR-31B/E	Be able to lock up to 64 indoor units' running mode to avoid modes conflict.
Building gateway		MD-CCM07/E	Building gateway connects to Lonworks® network for integrating to other BMS to realize air conditioner manage and control. It needn't match Midea network system and PC.
		MD-CCM08/E	Building gateway connects to BAKNET network for integrating to other BMS to realize air conditioner manage and control. It needn't match Midea network system and PC.
		Gateway 01/E	GateWay 01/E support the Modbus protocol network, bridge the Midea central AC system to the BMS, compose a Modbus network of up to 1024 indoor units and 64 outdoor units.
Network control software		New intelligent manager of midea	The 4th generation network monitoring system IMM – Intelligent Manager of Midea
Hotel card-inserted r assy.		MD-NIM05/E	Match hotel card system to control the air conditioner.
Digital ammeter		DTS634/DT636	Send the electric energy data to outdoor unit for realizing network fee charge function.
Infrared sensor		MD-NIM09/E	Automatically turn off and turn on the indoor unit, saving energy.

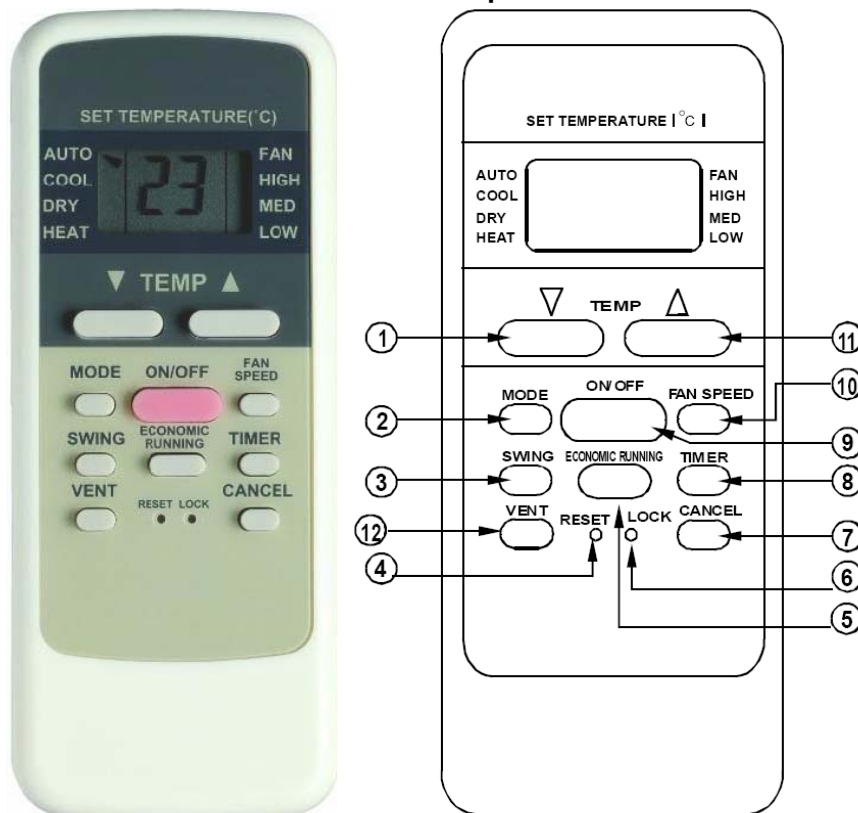
2.2 Wireless Remote Controller

Controller	Appearance	Model	Description
Wireless remote controller		R51C/BGE	More the following functions than general wireless remote controller: add water, add humid, exchange air, fresh air, and etc.
		R51D/E	General functions.
		R51/E	General functions and without economic mode.
		R51I4/BGE	General functions with backlight and FOLLOW ME.
		R05/BGE	Big screen and LCD display, with back light display, clock function.
		R06/BGE	The function is the same as R05/BGE, and only the appearance is different.
		R06/BGCE	For cooling only mode. The function is the same as R05/BGE, and only the appearance is different.
		RM05/BG(T)E-A	General remote functions with address setting function,

2.2.1 Wireless remote controller **R51C/BGE, R51D/E,R51/E,R51I4/BGE**

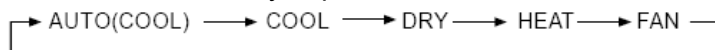
Apply to One-way/four way cassette/ Concealed duct/ Wall mounted type

2.2.1.1 Buttons and functions descriptions



① **TEMP**: Push the TEMP button to decrease the indoor temperature setting or to adjust the TIMER in a counter-clockwise direction.

② **MODE**: Each time you push the button, a mode is selected as the following figure indicates:



Note: "HEAT" is only for heat pump AC.

③ **SWING**: Push this switch button to change the louver angle.

④ **RESET**: Pushed, all current settings are cancelled and the control will return to the initial settings.

⑤ **ECONOMIC RUNNING**: Push this button to go into the Energy-Saving operation mode.

⑥ **LOCK**: Push this button to lock in all the current settings. To change the settings, push the button once more.

⑦ **CANCEL**: Push this button to cancel the TIMER settings.

⑧ **TIMER**: Preset the time ON (start to operate) and the time OFF (turn off the operation).

⑨ **ON/OFF**: Push this button to start the unit operation. Push the button again to stop the unit operation.

⑩ **FAN SPEED**: This button is used for setting Fan Speed in the sequence that goes from AUTO, LOW, MED to HIGH, then back to Auto.

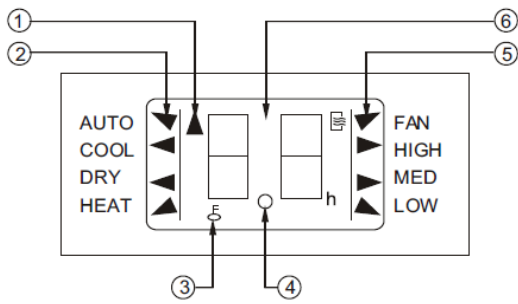
⑪ **TEMP**: Push the button to increase the indoor temperature setting or to adjust the TIMER in a clockwise direction.

⑫ **VENT**: Push this button to set the ventilating mode. The ventilating mode will operate in the following sequence:



Note: ventilation function is available for the fresh air series.

LCD display indications:



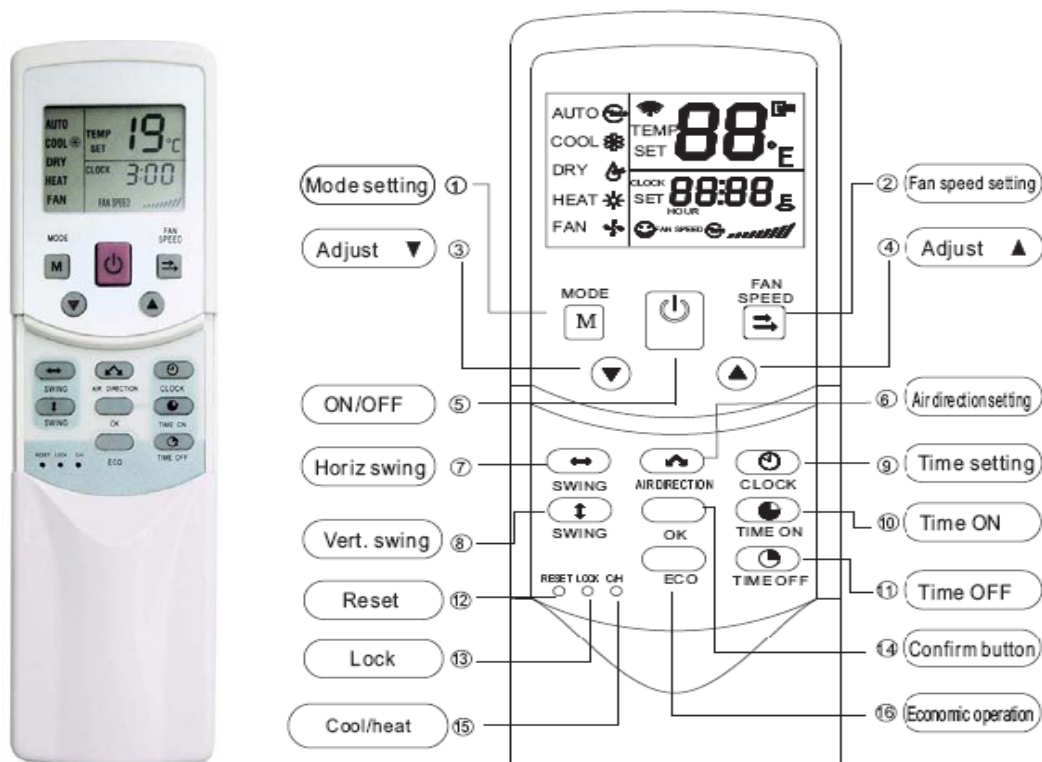
1--TRANSMISSION Indicator; 2--MODE Display; 3--HEAT PUMP ONLY-LOCK display;
4--TIMER Display; 5--FAN Display; 6--Digital Display Area.

2.2.2 Wireless remote controller R05/BGE, RM05/BG(T)E-A

Apply for Ceiling and floor type / four way cassette type.

Model	R05/BGE
Rated Voltage	3.0V(2 pieces of LR03 7# batteries)
Lowest Voltage	2.4V
Effective Distance	8M~11M
Operation Condition	-5℃~60℃

2.2.3.1 Buttons and functions descriptions



1. **MODE** : Each time you push the button, a mode is selected as the following figure indicates:

---->AUTO → COOL → DRY → FAN--

2. **FAN SPEED** : This button is used for setting Fan Speed in the sequence that goes from AUTO, LOW, MED to HIGH, then back to Auto.

---->AUTO → LOW → MED → HIGH--


3. **Decrease Temp.** Adjust to decrease the set temp. Keeping pressing will decrease the temp with 1° C per 0.5s.


4. **Increase Temp.** Adjust to increase the set temp. Keeping pressing will increase the temp with 1° C per 0.5s.


5. **ON/OFF** : For turning on or turning off the air conditioner.


6. **Wind Vert Swing** : Activate or turn off wind vertical swing function. (Only available when remote


controller is used with corresponding unit.)


7. **Wind Horiz Swing** : Activate or turn off wind horizontal swing function. (Only available when remote controller is used with corresponding unit.) (Only available when remote controller is used with corresponding unit.)


8. **CLOCK** : Display the current time. (12:00 is displayed when resetting or electrifying for the first time.) Press CLOCK for 5s, icon indicating hour digital will flash with 0.5s. Press it again, icon indicating minute digital will flash with 0.5s. Setting or modification is effective only by pressing OK button to make confirmation.

9. **Air direction** : Activate swing function of air deflector. Once pressed, air deflector will turn 6 degrees.

10. **TIME ON** : turn on the timer operation. Once pressing this button, the time will increase by 0.5 hour. When the set time exceeds 10 hours, pressing the button will increase the time by 1 hour. Adjusting the figure to 0.00 will cancel time ON setting.

11. **TIME OFF** : turn off the timer operation. Once pressing this button, the time will increase by 0.5 hour. When the set time exceeds 10 hours, pressing the button will increase the time by 1 hour. Adjust the figure to 0.00 will cancel time ON setting.

12. **RESET**  (inner located): Pushed, all current settings are cancelled and the control will return to the initial settings. (Press it with a needle of 1mm)

13. **LOCK**  Push this button to lock in all the current settings. To change the settings, push the button once more.

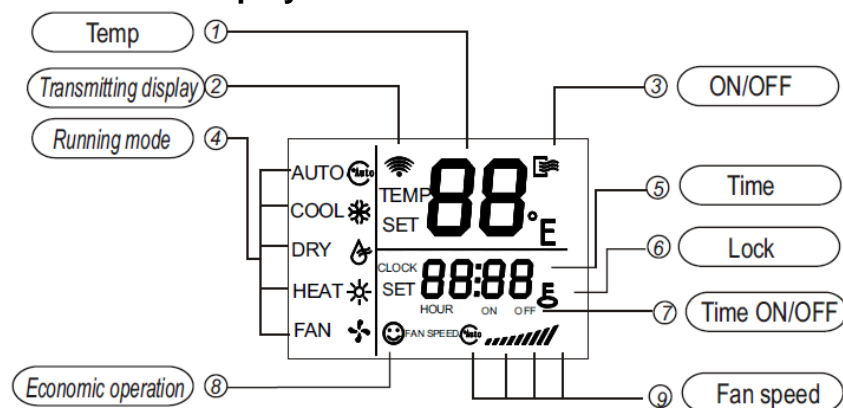
14. **OK**: Used to confirm the time settings and modification.

15. **C/H**: Used this button to change the machine to Cooling mode or Cooling/Heating mode.

16. **ECO**: Activate or turn off economic operation mode. Push this button to go into the Energy-Saving operation mode. (Only available when remote controller is used with corresponding unit.)

Note: RM05/BG(T)E-A is able to set the indoor units' addresses individually. The details please refer to the summary.

2.2.3.2 LCD display indications:



① **Temp**: Display the setting temperature.

② **Transmitting display**: This indicates that the remote controller is sending data.

③ **ON/OFF**: This indicates that the machine is on .

- ④ **Running mode:** This indicates the machine's running mode. Heating mode need the corresponding type of unit.
- ⑤ **Time:** Display the current time. User could press the CLOCK button for 5s to make this flash, then user could adjust the time by using the ▲ and ▼ buttons. Once time is right, press the OK button to confirm it.
- ⑥ **Lock:** When displayed, all the button is ineffective except the lock button.
- ⑦ **Timer ON/OFF:** This indicates the timer is working or not.
- ⑧ **Economic operation:** Indicates that whether the machine is working at the economic operation.
- ⑨ **Fan speed:** Shows the indoor unit's fan speed. The longer it's displayed, the stronger the wind blows.

Note: RM05/BG(T)E-A is able to set the indoor units' addresses individually. The details please refer to the summary.

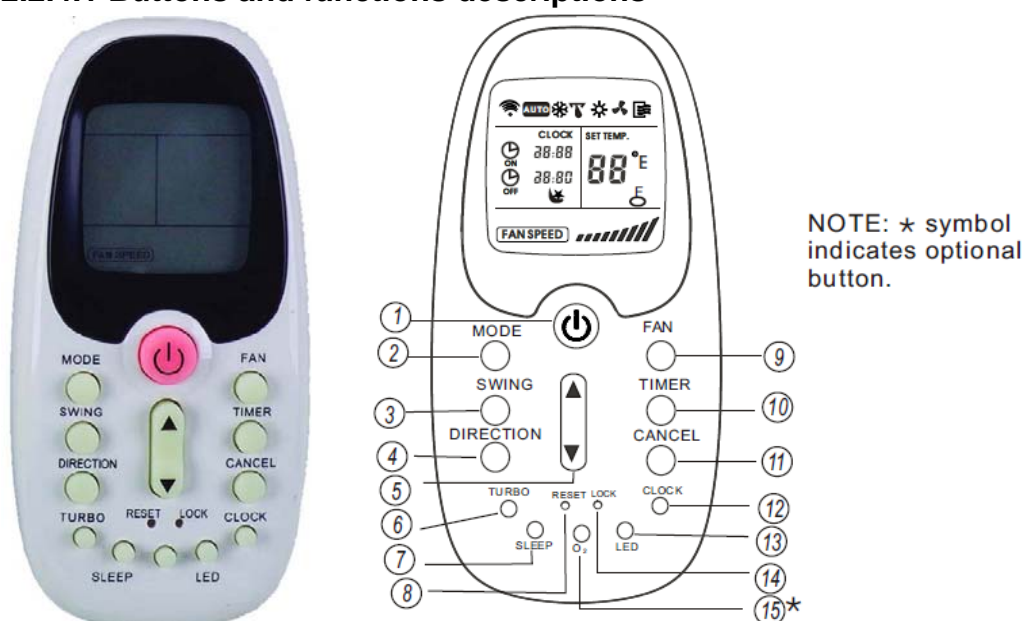
2.2.3 Wireless remote controller R06/BGE, R06/BGCE

The R06/BGE function is the same as R05/BGE, and only the appearance is different.

1. Operating Mode: AUTO, COOL, HEAT, DRY, and FAN.
2. Timer Setting Function in 24 hours.
3. Indoor Setting Temperature Range: 17°C~30°C.
4. LCD (Liquid Crystal Display) of all functions.

Model	R06(A)/BG(C)E
Rated Voltage	3.0V(Alkaline dry batteries LR03×2)
Lowest Voltage of CPU Emitting Signal	2.0V
Transmission Distance	8m(when using 3.0 voltage, it gets 11m)
Environment	-5°C to 60°C

2.2.4.1 Buttons and functions descriptions



ON/OFF Button: Push this button to start operation, push the button again to stop operation.

MODE Button: Each time you push the button, a mode is selected in a sequence that goes from AUTO, COOL, DRY, HEAT and FAN. NOTE: COOL only model has no HEAT feature.

SWING Button: Push the button, the louver would swing up and down automatically. Push again to stop.

DIRECTION Button: Press this button to change the swing angle of the louver. The swing angle of the louver is 6° for each press. When the louver swing at a certain angle which would affect the cooling and heating effect of the air conditioner, it would automatically change the swing direction. No symbol will appear in the display area when press this button.

TEMP/TIME Button: Push ▲ the button to increase the indoor temperature setting or to adjust the TIMER in a clockwise direction. Push ▼ the button to decrease the indoor temperature setting or to adjust the TIMER in a counter-clockwise direction.

TURBO Button: Push this button on COOL mode, the air conditioner goes into powerful cooling operation. Push again to cancel the TURBO function.

SLEEP Button: Press this button to go into the Energy-Saving operation mode. Press it again to cancel. This function is only can be used on COOL, HEAT and AUTO mode and maintain the most comfortable temperature for you.

NOTE: While the unit is running under SLEEP operation mode, it would be canceled if you press the other button.

RESET Button: When you press the recessed RESET button, all current settings are cancelled and the control will return to the initial settings.

FAN Button: Used to select the Fan Speed in four steps AUTO, LOW, MED or HIGH. Each time the button is pressed, the fan speed mode is shifted.

TIMER Button: This button is used to preset the time ON (start to operate) and the time OFF (turn off the operation).

CANCEL Button: Push this button to cancel the TIMER ON/OFF settings.

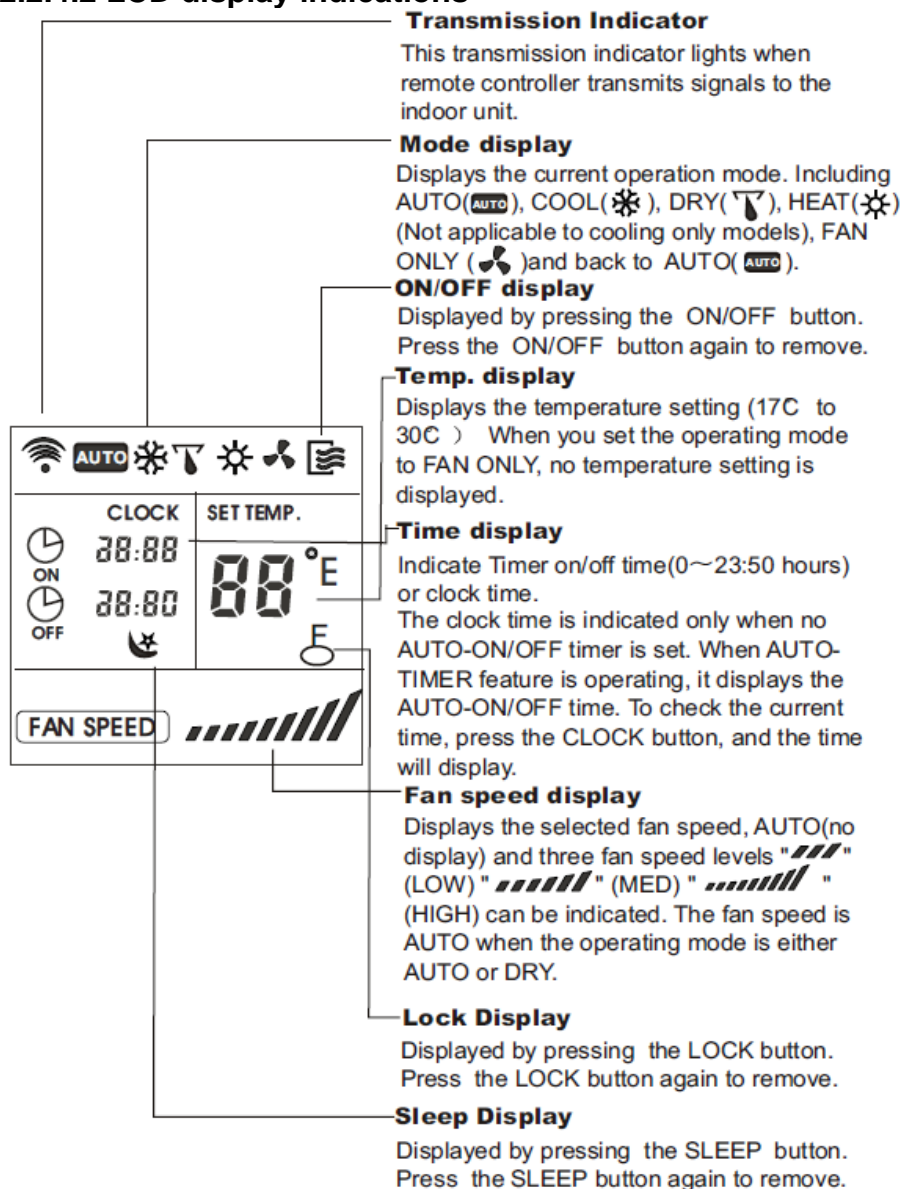
CLOCK Button: Use to set the time.

LED Button: Press this button to clear the digit display in the air conditioner, press it again to activate it.

LOCK Button: When you press the LOCK button, all current settings are locked in and the remote controller does not accept any operation except that of the LOCK. Press again to cancel the LOCK mode.

O₂ Button (optional): Push this button to activate the oxygen generating mechanism, and the oxygen density of indoor varies. Push again to stop the function.









2.2.4.2 LCD display indications



Note:

All displays on the remote controller are shown for illustration purposes only.

Summary:**Comparison of remote controllers**





Function								
	R05/BGE	RM05/BG(T)E-A	R06/BGCE	R06/BGE	R51C/BGE	R51D/E	R51/E	R51I4/BGE
On/Off	●	●	●	●	●	●	●	●
Cooling mode	●	●	●	●	●	●	●	●
Heating mode	●	●	—	●	●	●	●	●
Fan mode	●	●	●	●	●	●	●	●
Dehumidifying mode	●	●	●	●	●	●	●	●
Auto mode	●	●	●	●	●	●	●	●
Swing function	●	●	●	●	●	●	●	●
Economic mode	●	●	—	—	●	●	—	●
Remote controller lock	●	●	●	●	●	●	●	●
Fan speed control	●	●	●	●	●	●	●	●
Daily time setting	●	●	—	—	—	—	—	—
Background light	●	●	●	●	●	—	—	●
Current time	●	●	—	—	—	—	—	—
FOLLOW ME	—	—	—	—	—	—	—	●
Address setting	—	●	—	—	—	—	—	—

How to set address through Wireless Remote Controller

- 1) Press the LOCK button for more than 5 seconds, then the controller get into address setting mode.
- 2) Then press the ON/OFF button to start transmitting signal in the address setting mode. When working in address setting mode, press ON/OFF will not turn the controller off.
- 3) In the address setting mode, there are 2 main functions:
 Querying mode: Please point the remote controller to the indoor unit, then press MODE button, the corresponding indoor unit will display its address.
 Setting mode: Use the UP and DOWN buttons to choose an address you want. Then point the remote controller to the indoor unit and then press the FAN button to set the indoor unit's address. The corresponding indoor unit will display the new address and record it. After about 4 seconds, this displaying will fade out and the indoor unit turn to normal display mode.
- 4) After setting all the addresses, users can press the LOCK button for 5 seconds to quit the address

setting mode.

2.3 Wired Controller

Controller	Appearance	Model	Description
Wired controller		KJR-10B/DP(T)-E	General control function. Connected to the indoor unit display panel's corresponding port.
		KJR-10B/DPC(T)-E	The function is generally the same as the KJR-10B/DP(T)-E, but excluding the heat mode.
		KJR-10B/DP(T)-E(Korean)	A Korean Edition bases on the KJR-10B/DP(T)-E.
		KJR-12B/DP(T)-E	This controller integrate FOLLOW ME function, others is the same with KJR-10B/DP(T)-E.
		KJR-12B/DPBG(T)-E	Bases on the KJR-12B/DP(T)-E and is with backlight, vertical and level swing function.
		Dun-KJR-12B/DP(T)-E	FOLLOW ME and configured with a 20M wire. There's no brand and backlight on it.
		KJR-90A	All basic function is the same as KJR-10B/DP(T)-E.
		KJR-90A1-E	To avoid mode confliction running mode is fixed to cool mode, other functions are the same as KJR-90A.
		KJRF-180A	

Safety precautions:

Please read this safety precaution carefully, before installation. Do observe the following safety precautions, for they are very important.

Confirm there is no abnormal phenomenon during test operation after installation completed, then hand the manual to the user.

Installation must be conducted by professionals;

Improper installation may cause electric shock or fire;

A random disassembly may cause abnormal operation or heating, which may result in fire.

Don't install it in a place where combustible gas easily leaks. Once combustible gas leaks and remains around Controller, fire may be caused.

Wire must be suitable for the current of Controller. Otherwise electricity leakage or heating may be caused, which may result in fire.

Wire must be suitable for controller, never bring outside force to bear on the terminal. Otherwise wire break or heating may be caused, which may result in fire.

Installation location:

Do not install it in a place with oil, steam or sulphur gas, or else deform or malfunction may occur.

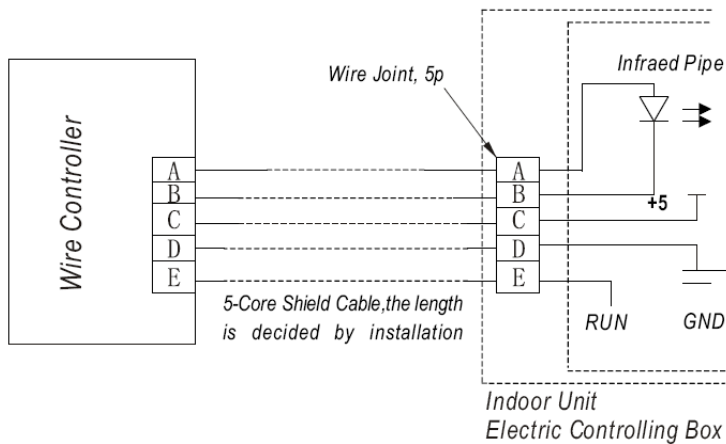
Wire controller installation notice:

1. This installation manual contains information about the procedure of installing Wire Controller.

Please refer to Indoor Unit Installation Manual for connecting between Wire Controller and Indoor Unit.

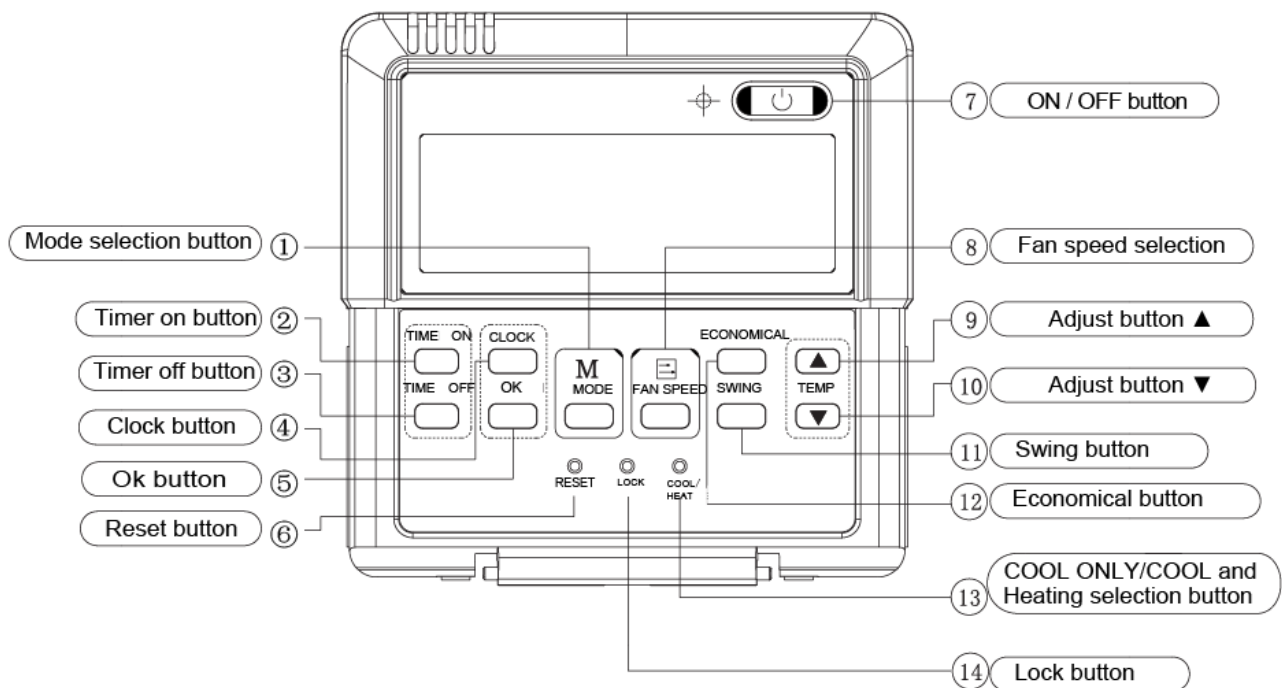
2. Circuit of Wire Controller is low voltage circuit. Never connect it with a standard 220V/380V circuit or put it into a same Wiring Tube with the circuit.

3. The shield cable must be connected stable to the ground, or transmission may fail.
4. Do not attempt to extend the shield cable by cutting, if it is necessary, use Terminal Connection Block to connect.
5. After finishing connection, do not use Megger to have the insulation check to the signal wire.



Note: When the air conditioner needs the constant frequency wire Controller, be sure adding a Wire Joint with 5 terminal named A, B, C, D, E in indoor unit, and fixing a infrared emitter whose anode and cathode connecting with A and B near the receiver in the Indoor Unit Switch Board, then connecting the terminal +5V, GND, Run in the Switch Board to C, D, E respectively.

2.3.1 Wired controller **KJR-10B**



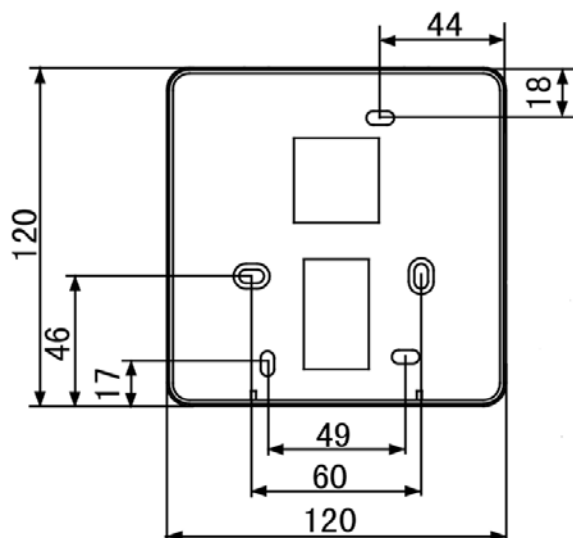
2.3.1.1 Appearance

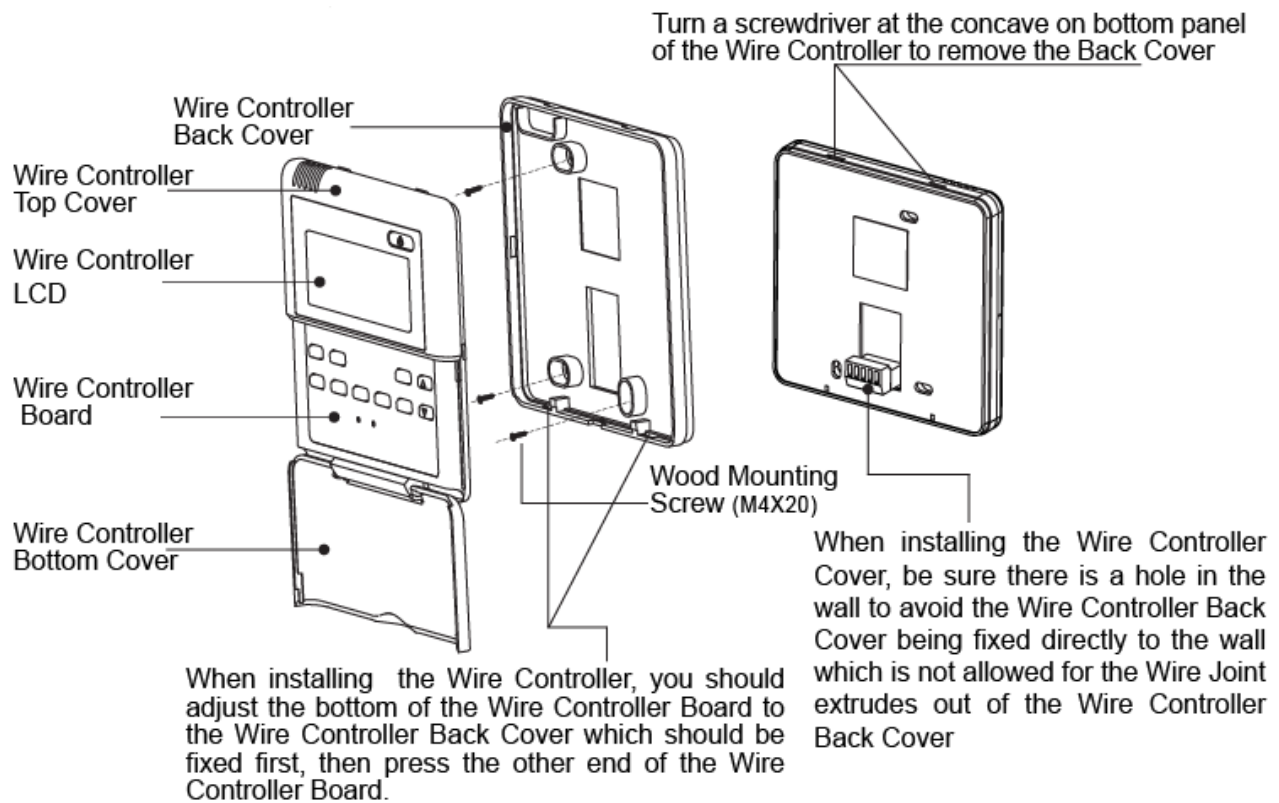
Apply to One-way/four way cassette/ Concealed duct/ Ceiling and floor/ Wall mounted type

Button ⑬: For some machines with auxiliary electric heater, this button may help with change the machines in to cooling mode only. Factory default setting is cooling and heating mode both exist. Some types do not have this button.

2.3.1.2 Installation

Dimensions: 120*120*15mm





Preparation before Installation:

Make sure the following parts have been prepared.

NO.	Name	QTY.	Remarks
1	Wire Controller	1	With Cover
2	Wood Mounting Screw	3	M4×20(For mounting on the wall)
3	Mounting Screw	3	M4×25(For Mounting on the electrical switch box)
4	Installation Manual	1	-
5	Owner's Manual	1	-

Prepare for the following at installation site.

NO.	Name	QTY.		Remarks
		Install into the wall	Install on the wall	
1	5-core Shield Cable	1	1	0.05mm ² ×5 Cable no more than 15M
2	Switch Box	1	-	-
3	Wiring Tube(Insulating Sleeve and Tightening Screw)	1	-	-

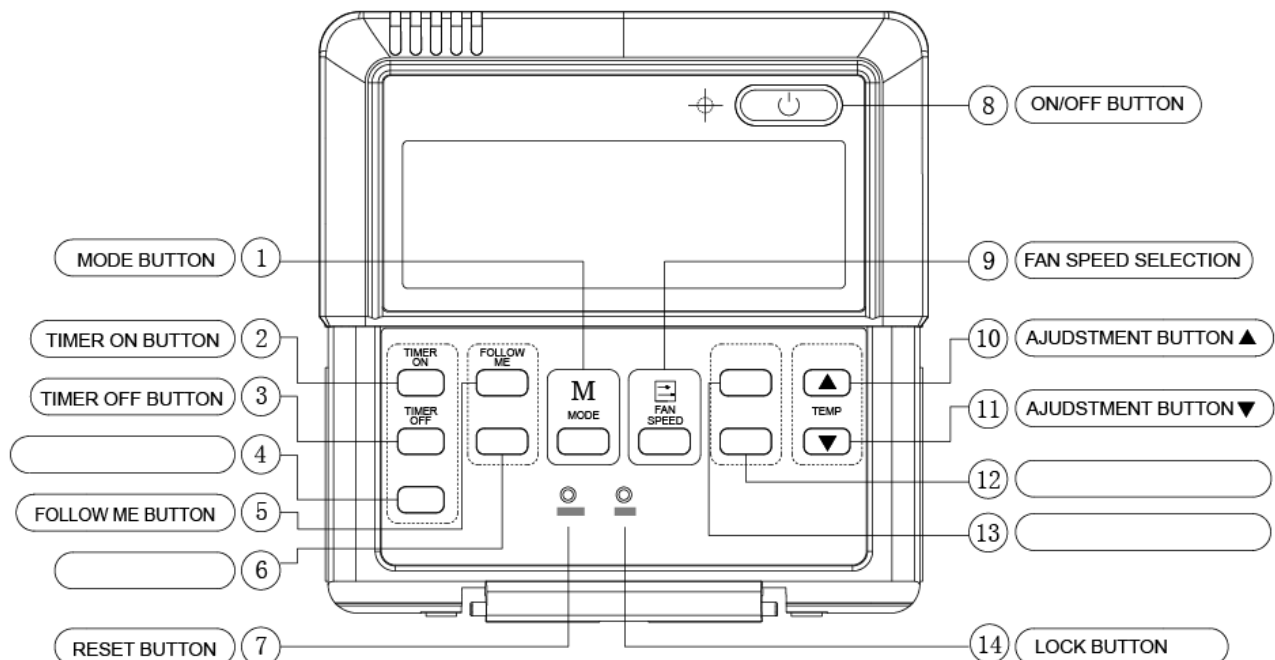
Note: Do not turn screws too tightly, or else the cover would be sunk or the Liquid Crystal may be broken.

2.3.2 Wired controller **KJR-12B**

2.3.2.1 Appearance

Apply to the customized indoor unit.

Add ambient temperature displaying function based on KJR-10B/DP(T)-E.



Button ④: This button is not designed on all the types. If exists, it stand for economic running mode.

Button ⑥: There are 2 type of this button.

AUXIL HEATER: Auxiliary electricity heater.

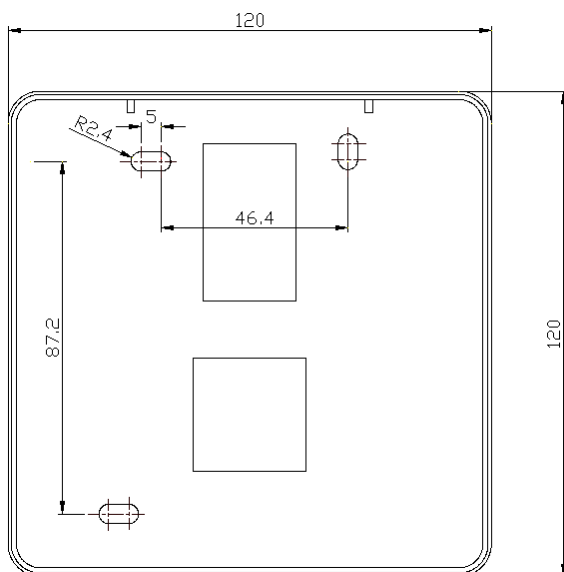
TURBO: In cooling mode, this button stands for powerful cooling mode, available to some mode designed with this function. In heating mode, this button will cause electric auxiliary ineffective.

Button ⑫: Pattern \updownarrow means the vertical swing function and "SWING" means the normal swing function.

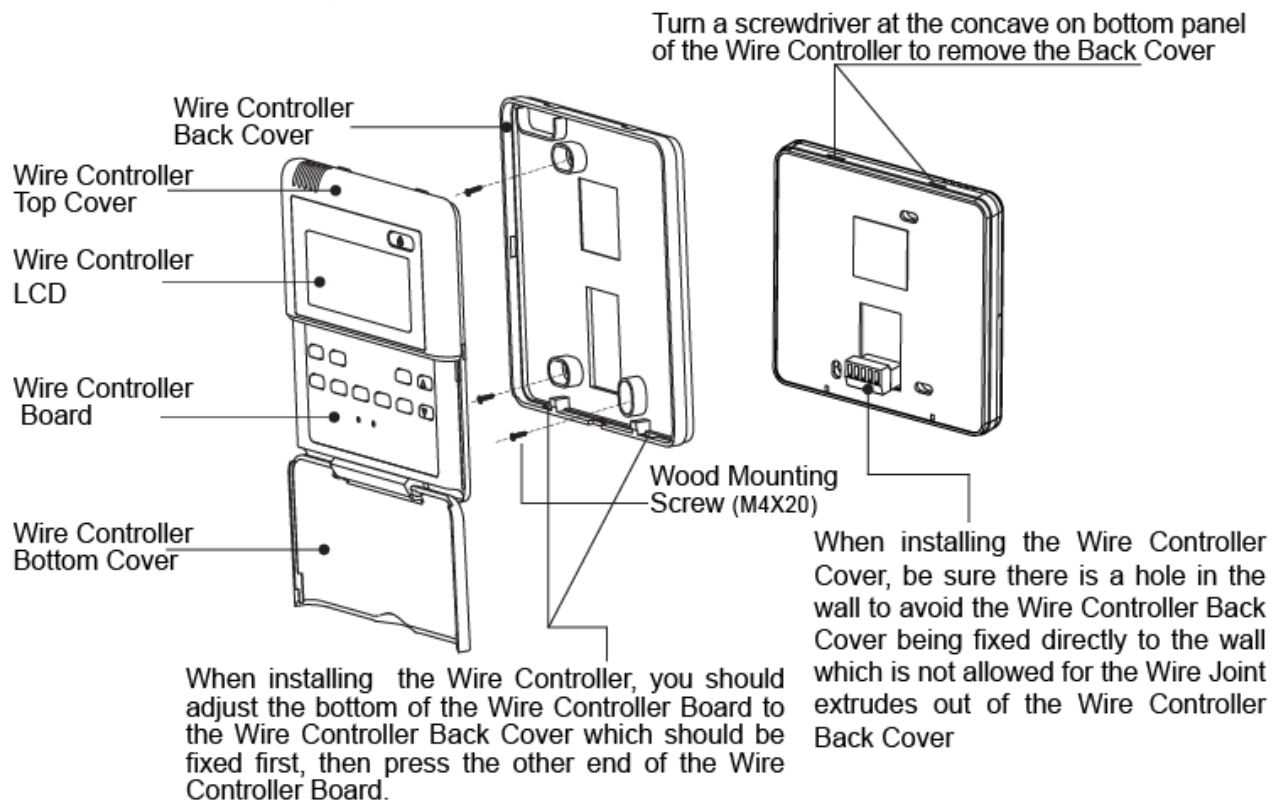
Button ⑬: Pattern \leftrightarrow means the horizontal swing function and "ECO" means the economic function.

2.3.1.2 Installation

Dimension: 120*120*15mm



Installation of wire controller:



Preparation before Installation:

Make sure the following parts have been prepared.

NO.	Name	QTY.	Remarks
1	Wire Controller	1	With Cover
2	Wood Mounting Screw	3	M4×20(For mounting on the wall)
3	Mounting Screw	3	M4×25(For Mounting on the electrical switch box)
4	Installation Manual	1	-
5	Owner's Manual	1	-

Prepare for the following at installation site.

NO.	Name	QTY.		Remarks
		Install into the wall	Install on the wall	
1	5-core Shield Cable	1	1	0.05mm ² ×5 Cable no more than 15M
2	Switch Box	1	-	-
3	Wiring Tube(Insulating Sleeve and Tightening Screw)	1	-	-

Note:

Never turn screws too tightly, or else the cover would be sunk or the Liquid Crystal breaks.

Installation of wired controller KJR-12B/DP(T)-E is the same to KJR-10B/DP(T)-E.

2.3.3 Wired controller **KJR-90A**

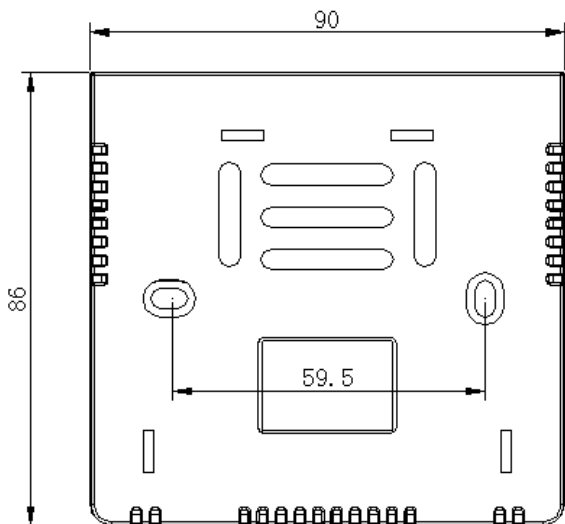
2.3.3.1 Appearance

Button description:

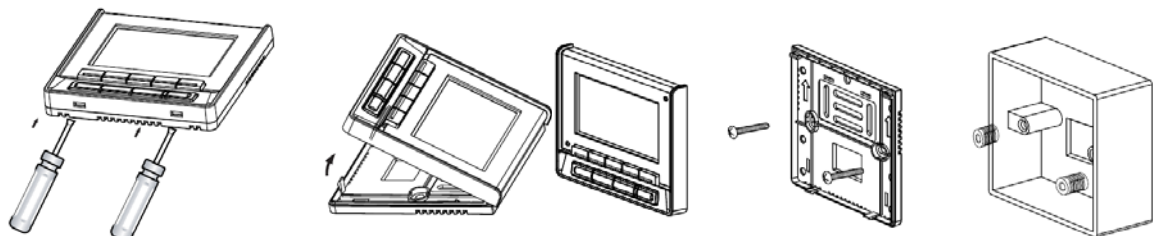


2.3.4.2 Installation

Dimension: 90*86*13mm



Installation of wire controller:



Preparation before Installation:

Make sure the following pasts has been prepared.




NO.	Name	QTY.	REMARK
-----	------	------	--------

1	Wire controller	1	—
2	Cruciform slot screw M4×25	2	The accessory is need when install the wire controller to the electric cabinet.
3	Plastic bolt	2	
4	Installation and owner's manual	1	—
5	Connective wires to the signal receive panel	1	Shielded 5-core cable.







Prepare for the following at installation site.

NO.	NAME	QTY.	REMARK
1	Electric cabinet	1	Universal electric cabinet's specification. Pre-embed it into wall.
2	Shielded 5-core cable	1	Pre-embed RVVP-0.5mm ² ×5
3	Wire configured tube(insulate sheath)	1	Pre-embedded in to the wall and the length should be less than 15m
4	Cruciform screwdriver	1	To install cruciform slot screw
5	Slotted head screw	1	To split the bottom from the wire controller

Summary**Comparison of wired controllers**

appearance								
Model	KJR-10B/ DP(T)-E	KJR-10B/ DPC(T)- E	KJR-10B/ DP(T)-E(Korean)	KJR-12B/ DP(T)-E	KJR-12B/ DPBG(T) -E	Dun-KJR -12B/DP(T)-E	KJR-90A	KJR-90A 1-E
On/off	●	●	●	●	●	●	●	●
Auto	●	●	●	●	●	●	●	-
Cooling	●	●	●	●	●	●	●	●
Dehumidify	●	●	●	●	●	●	●	-
Fan	●	●	●	●	●	●	●	●
Heating	●	-	●	●	●	●	●	-
On/off Timer	●	●	●	●	●	●	●	●
Temp. Setting	●	●	●	●	●	●	●	●
Horizon Swing	●	●	●	●	●	●	●	●
Vertical Swing	-	-	-	-	●	-	-	-
Economical mode	●	●	●	●	●	●	-	-
FOLLOW ME	-	-	-	●	●	●	-	-
Backlight	-	-	-	-	●	-	-	-
Powerful cooling	-	-	-	-	●	-	-	-
Lock mode	●	●	●	●	●	●	-	-
Cooling/Cooling & Heating Selection	●	-	●	-	-	-	-	-
Electric Auxiliary Heating ON	-	-	-	-	-	●	-	-

2.4 Central Control Monitor

Controller	Appearance	Model	Description
Centralized Controller		MD-CCM03/E(M)	No.2 generation central control monitor of indoor unit. Add mode lock, big screen appearance, blue back light display, and mode memory function based on MD-CCM01/E.
		MD-CCM09/E	The weekly schedule central controller of indoor unit. Control Max. 64 indoor units and possess week schedule function, but cannot connect network control system.
		KJR-90B/M	New general controller of indoor unit. It is only switch, which cannot change special mode, but it can simultaneously switch max. 16 indoor units.
		MD-CCM02/E	The central control monitor of outdoor unit. Monitor max. 32 outdoor units.
		KJRF-180A/MBT-E	Be able to control up 16 indoor units and a water heater, including one fresh air unit.
		KJR-31B/E	Be able to lock up to 64 indoor units' running mode to avoid modes conflict.

2.4.1 Central control monitor MD-CCM03/E(M)

Central control monitor MD-CCM03/E(M) is a remote wired controller that is used for controlling up to 64 indoor unit. Moreover, we could create our AC network with this device, including the PC central monitoring system and the BMS(Building Management System).

- Memory function: It can record the running parameters (mode/fan speed/temp.) when using the controller to turn on the indoor units, all the unit will work as the last setting.
- Automatically record all setting info when lose power
- RS485 communication protocol
- Clear & bright LCD display screen,
- Background light, more parameters display
- Emergency ON/OFF control with simple dry contact input

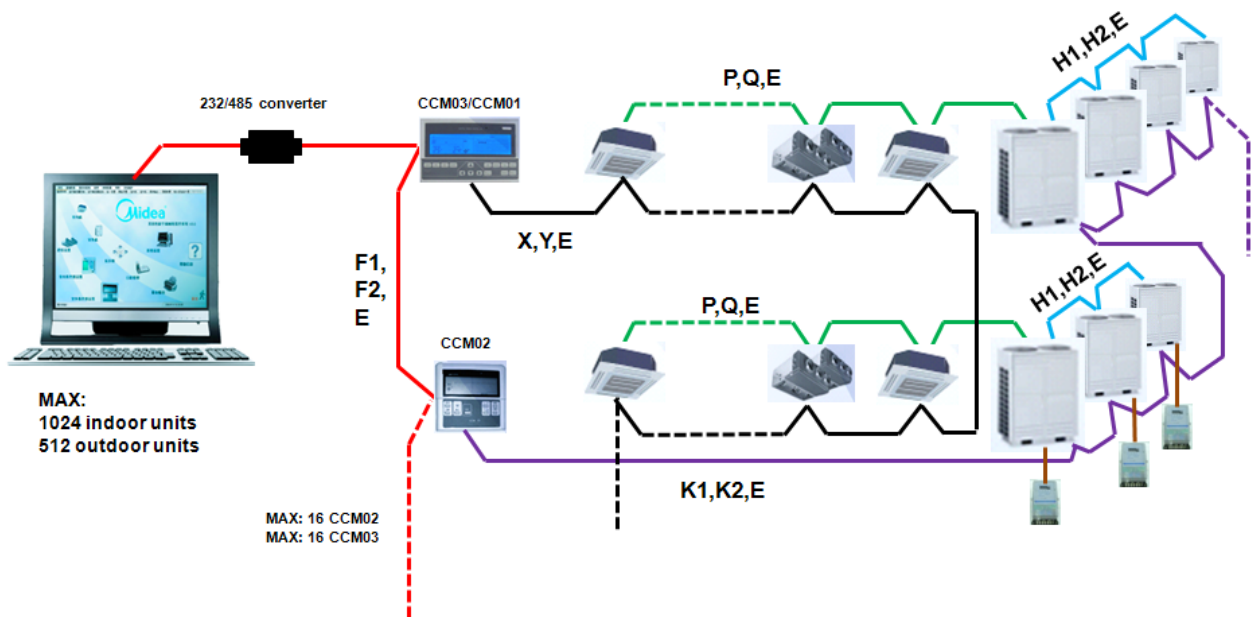
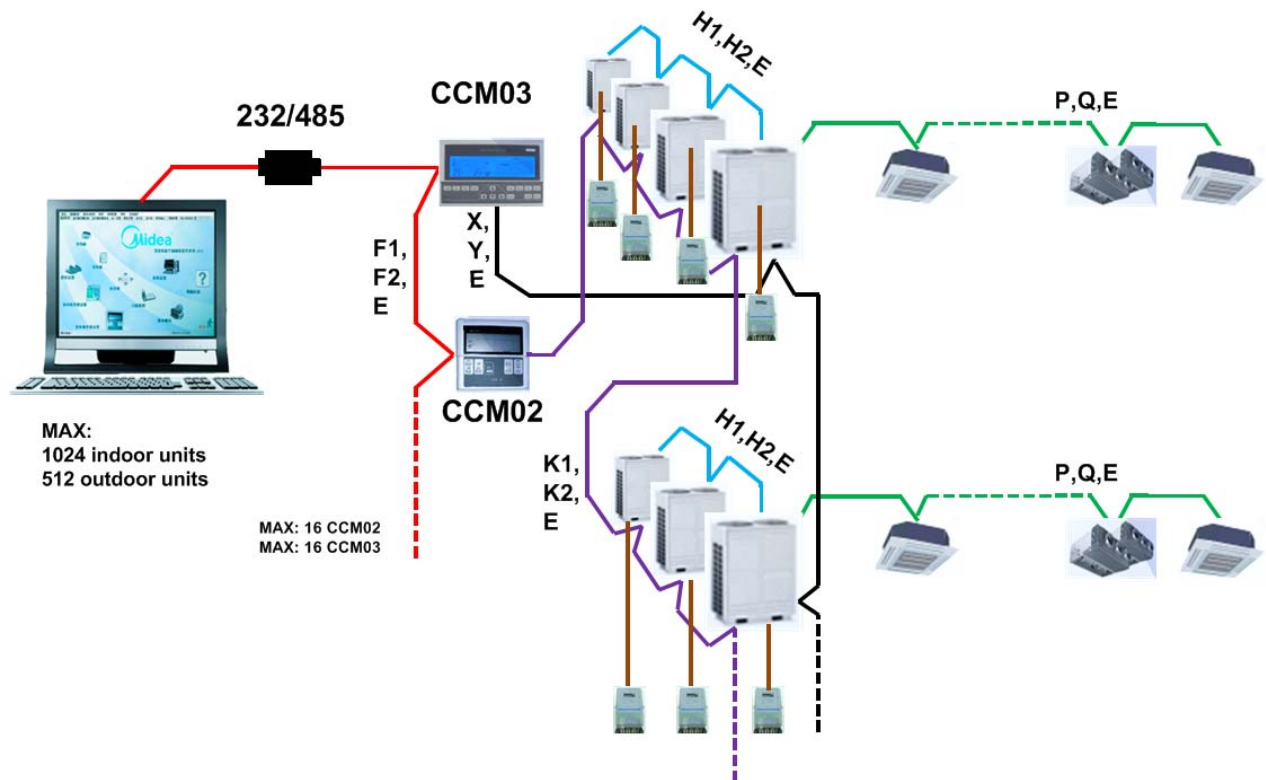
2.4.1.1 System configure

With MD-CCM03/E(M), we could both centrally control the indoor units and bridge up to 64 indoor units to the PC monitoring software or BMS. In fact, on the purpose of connecting the indoor units to the PC or the gateway, which makes the indoors units visible and can be controlled, MD-CCM03/E (M) is necessary.

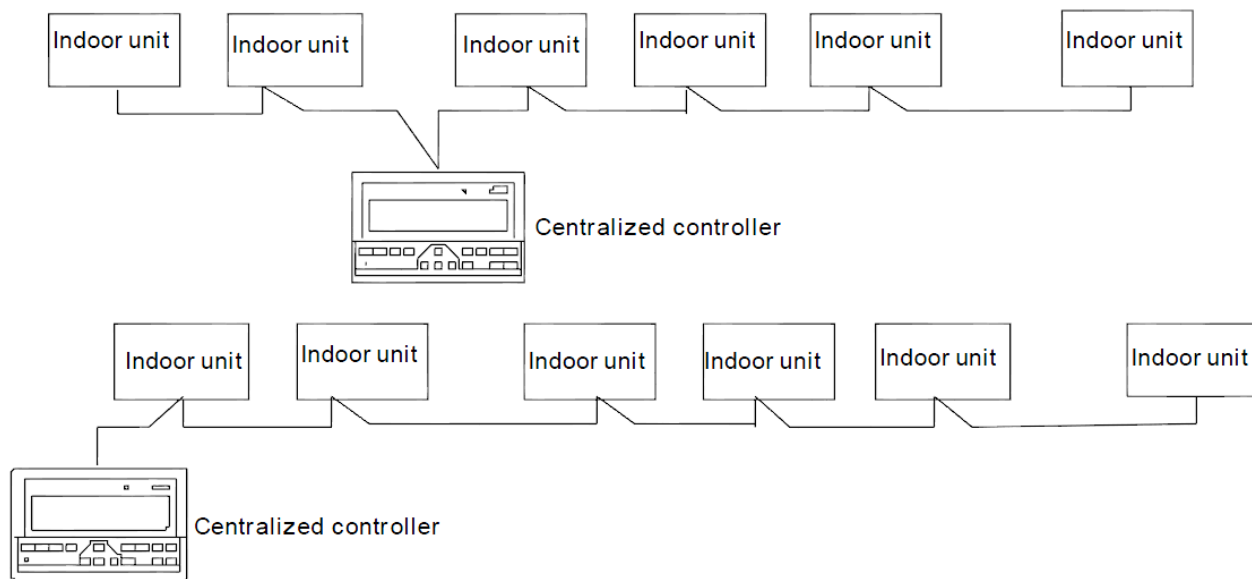
1. All the indoor units and outdoor units are V4+ series, the topology of the network is as follows:



2.The indoor units contains any V4 series, the network topology is as follows:



For the 2nd type of network topology, either of the connection below is available:



To establish a steady network the following should be noted

- The signal wire should be 3-core shielded wire and the wire should be provided by licensed electricians.
- To make signal transmission steady and to protect the facilities, the signal transmission wires should not be near to the power line. An interval of 300mm-500mm should exist between these two kinds of wires.
- The signal wire of each network should be less than 1,200m.
- The unit and the centralized controller should be connected hand-in-hand, which means that all the units' same port should be connected to a 3-core wire and the signal wire should be linear in topology. Or else, the facilities could not work normally.

2.4.1.2 Description Names and Functions

Keywords and general function description

1 Power on or reset

When the centralized controller is powered on or reset, all display segments of the LCD are luminous for 2 seconds and then goes off. 1 second later, the system enters the normal display status. The centralized controller is in the main page display status and displays the first page, and searches the in-service air conditioners in the network. Once the search is finished, the centralized controller enters the mode setting page, and sets the first in-service air conditioner by default.

2 Network area address of centralized controller

The local computer or gateway can be connected with 16 centralized controllers for communication. Each centralized controller serves as an area of the air conditioner network. The centralized controllers are differentiated by bit selection address. The configurable range is 0~15.

3 State indications

If any local keypad operation is setting the operation status of the air conditioner, the indicator is on when the signals are sent. Upon completion of the setting process, the indicator goes off. If an in-service air conditioner in the network is faulty, or the centralized controller network itself is faulty, the indicator will blink at 2Hz.

If one or more in-service air conditioners in the network are running, including under setting of timing

start/shutdown, the indicator will be luminous. Otherwise, the indicator is off.

4 Locking of centralized controller

After receiving the centralized controller locking command sent from the computer, the centralized controller disables the startup/shutdown and setting of the air conditioner, and sends commands to lock remote controllers of all air conditioners in the network of the centralized controller. After receiving the unlocking command, the centralized controller enables the startup/shutdown operation, and sends commands to unlock the remote controller of all air conditioners.

The locking status of the remote controller can be locked or unlocked by the computer or centralized controller separately. The locking status of the centralized controller is memorized after power failure of the centralized controller, and will not vanish after the power supply is restored, unless the command of unlocking is received.

5 Mode locking function

After the mode locking command is received, the command is forwarded to the air conditioner, and the centralized controller displays the mode locking flag. After the command of unlocking is received, the non-conflict mode can be selected freely. The centralized controller can also lock modes of all indoor units.

6 Emergent shutdown and compulsory startup

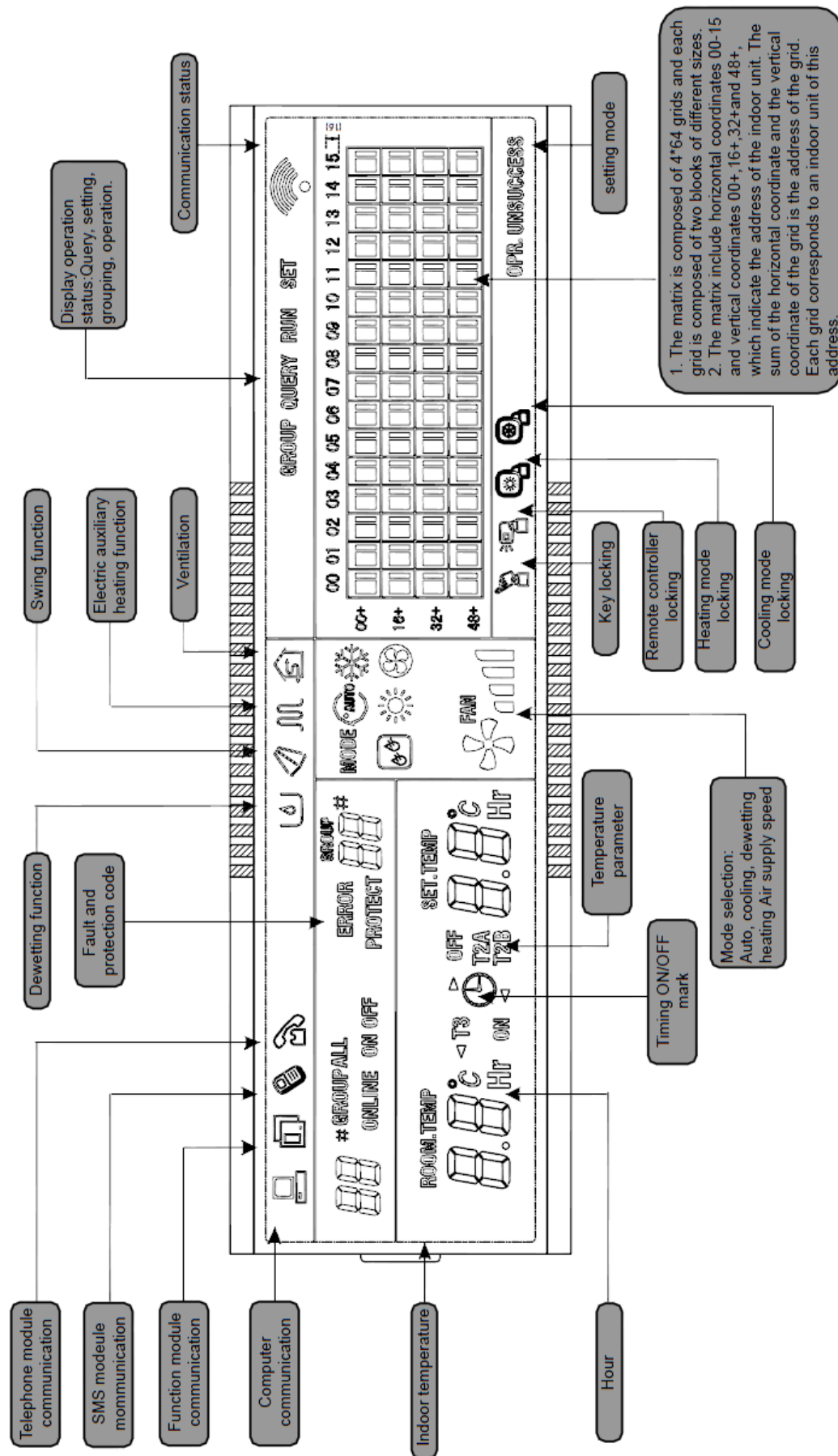
When the emergent shutdown switch of the centralized controller is shorted, all air conditioners in the network of the centralized controller will shut down compulsorily. The centralized controller and computer and all functional modules are disabled from startup and shutdown until the foregoing switch is open.

When the compulsory startup switch of the centralized controller is shorted, all air conditioners in the network of the centralized controller will start up compulsorily. In default conditions, they will run in the cooling mode. The startup and shutdown operations of the centralized controller and the computer and all functional modules will be disabled (only the command of startup is sent to the air conditioner, without affecting operation of the remote controller after startup) until the foregoing switch is opened.

If the foregoing two switches are shorted in the same time, the emergent shutdown switch shall have preference.

Liquid Crystal Display:

Full display of LCD



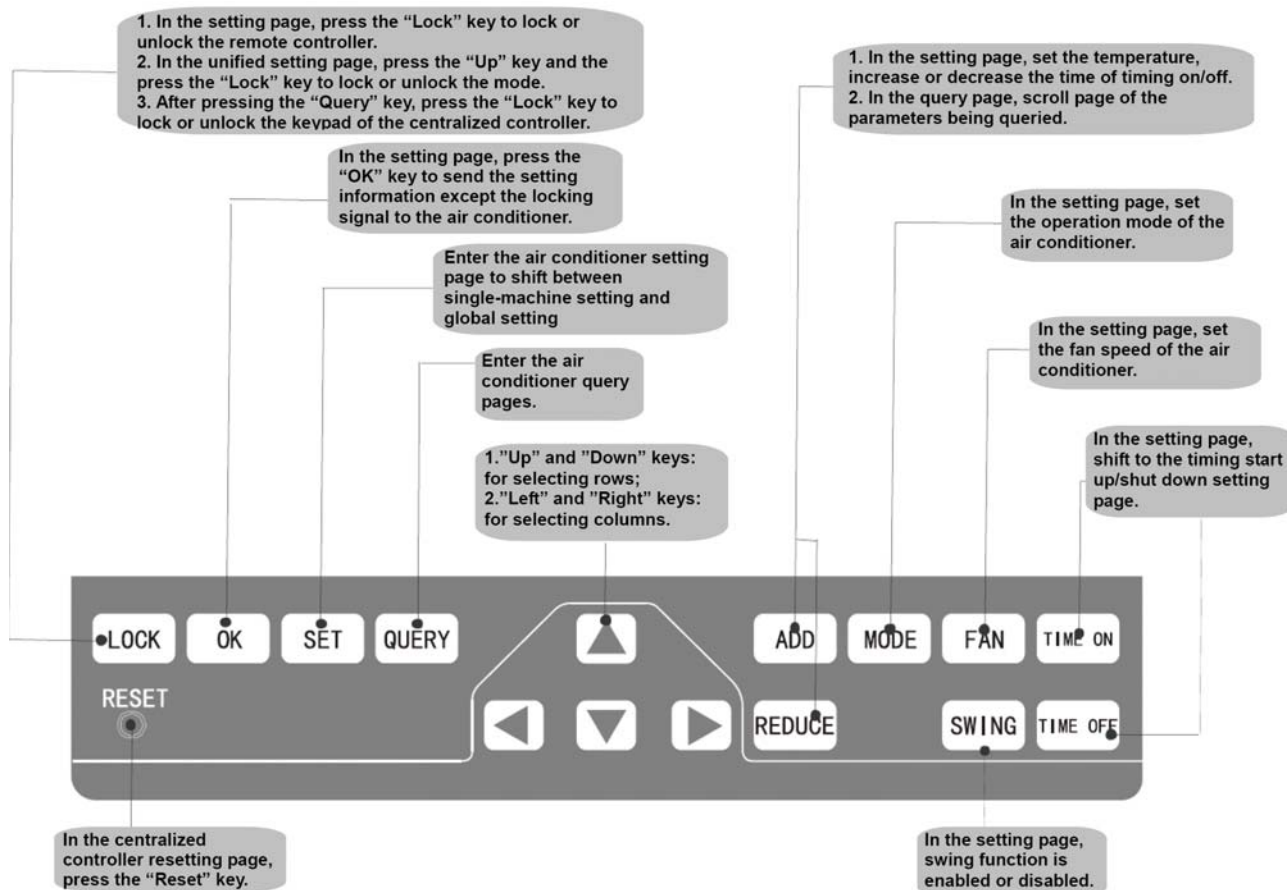
Note:

Each grid composes two blocks, whose sizes are different and indicates different status. Indications are

as follows:

status	Constantly on	Slow blink	Fast blink	Disappeared
Object				
Big block	Unit is in service	Selected		Out of service
Small block	Power is on		Unit malfunction	Power is off

Buttons and Functions



1) Query key

Any time when you press the key, the selected operation mode is to query the operation status of the air conditioner. By default, the first in-service air conditioner will be queried. Through the Increase and Decrease keys, you can change the parameter page to be queried; through the Up, Down, Left and Right keys, you can change to query status of other in-service air conditioners.

2) Set key

In other display mode, press the key to enter the setting mode. By default, it is single setting, and the first in-service air conditioner is displayed. In setting operation mode, press the key again, and the operation will be performed for all air conditioners in the network. Press the key repeatedly to shift between single setting and global setting.

→ Single → Global →

3) Mode key

In setting operation mode, press this key to set the operation

→ cooling → heating → supply air only → stop →

In other display mode, press the key to enter the setting mode. By default, it is single-machine setting, and the first in-service air conditioner is displayed.

4) Fan key

In setting operation mode, press this key to set the fan of the indoor unit of the air conditioner to run in

the automatic, high, medium or low level of air.

→ auto → low → medium → high →

5) Time on key

In setting operation mode, press this key to set the timing startup of air conditioner; press the key again to exit the timing setting, and restore the normal temperature regulation operation mode.

→ time on → set temperature regulation →

6) Time off key

In setting operation mode, press this key to set the timing shutdown of air conditioner; press the key again to exit the timing setting, and restore the normal temperature regulation operation mode.

→ time on → set temperature regulation →

7) Swing

In setting operation mode, press this key to enable or disable the swing function. If all currently selected air conditioners have no swing function, no effect will result after pressing the key.

8) Leftward key

In the query mode, every time when you press the key, the operation status data of the previous air conditioner will be displayed. If it is currently on the first machine, press the key again, and the data of the last machine will be displayed. If you hold down this key, the address will decrease one by one.

In the setting mode, every time when you press the key, if it is in single operation mode, the air conditioner of the previous in-service address number will be selected. If it is in the global operation mode, no effect will result after the key is pressed.

In the main page, press the key to enter the query mode. By default, it is the first air conditioner in-service.

9) Rightward key

In the query mode, every time when you press the key, the operation status data of the last air conditioner will be displayed. If it is currently on the last machine, press the key, and the data of the first machine will be displayed. If you hold down this key, the address will increase one by one.

In the setting mode, every time when you press the key, if it is in the single operation mode, the air conditioner of the next in-service address number will be selected. If it is in the global operation mode, no effect will result after the key is pressed.

In the main page, press the key to enter the query mode. By default, it is the first in-service air conditioner.

10) Downward key

In the query mode, every time when you press the key, the operation status data of the air conditioner corresponding to the next row of the matrix will be displayed. If it is currently in the last row, press the key, and the data of the air conditioner corresponding to the first row will be displayed. If you hold down this key, the row will increase one by one.

In the setting mode, every time when you press the key, if it is in the single operation mode, the air conditioner corresponding to the last row will be selected. If it is in the global operation mode, no effect will result after the key is pressed.

In the main page, press the key to enter the query mode. By default, it is the first in-service air conditioner.

11) Upward key

In the query mode, every time when you press the key, the operation status data of the air conditioner corresponding to the previous row of the matrix will be displayed. If it is currently in the first row, press the key, and the data of the air conditioner corresponding to the last row will be displayed. If you hold down this key, the row will decrease one by one. In the setting mode, every time when you press the key,

if it is in the single operation mode, the air conditioner corresponding to the previous row will be selected. If it is in the global operation mode, no effect will result after the key is pressed.

In the main page, press the key to enter the query mode. By default, it is the first in-service air conditioner.

12) Add key

In the main page or the query mode, every time when you press the key, the data of the last page will be displayed. If it is now in the last page, press the key again, and the first page will be displayed.

In the setting mode, every time when you press the key, if it is in the temperature regulation mode, the set temperature will decrease by 1 °C until the highest allowed set temperature; if it is in the timing startup/shutdown time setting mode, select the upper-level set time, if no time is set, 0.0 will be displayed, if you hold down the key, the upper-level data will be selected consecutively.

The specific change mode is as follows:

0.0→0.5→1.0→1.5→2.0→2.5→3.0→3.5→4.0→4.5→5.0→5.5→6.0→6.5→7.0→7.5→ 8.0→8.5→9.0
→9.5→10→11→12→13→14→15→16→17→18→19→20→21→22→23→24

13) Reduce key

In the main page or the query mode, every time when you press this key, the data of the current page will be displayed. If it is now in the first page, press the key again, and the last page will be displayed.

In the setting mode, every time when you press the key, if it is in the temperature regulation mode, the set temperature will decrease by 1 degree until the lowest allowed set temperature; if it is in the timing startup/shutdown time setting mode, select the upper-level set time, if no time is set, 0.0 will be displayed, if you hold down the key, the upper-level data will be selected consecutively.

The specific change mode is as follows:

0.0← .5←1.0←1.5←2.0←2.5←3.0←3.5←4.0←4.5←5.0←5.5←6.0←6.5←7.0←7.5←8.0←8.5 ←9.0←
9.5←10←11←12←13←14←15←16←17←18←19←20←21←22←23←24

14) ON/OFF key

Any time when you press the key, the centralized startup/shutdown operation is performed for all current in-service air conditioners in the centralized controller network. If all in-service air conditioners in the network are in the power-off status, press the key to perform the startup operation.

If it is in the mode setting page currently, and the parameters such as startup mode, temperature and air speed are selected, the air conditioner will be started according to the selected parameters.

If no mode is selected currently, and the air conditioner is powered off or it is in other display page currently, and the default startup mode is: Cooling, strong air, set temperature 24°C, swing function enabled. The default startup mode is locked according to the system mode or judged according to other constraint conditions. If any conflict exists, the next conflict-free mode will apply automatically. If conflict exists for all modes, startup will be impossible. If one or more in-service air conditioners in the network (including in the timing process of timing startup/shutdown), pressing this key will shut down all air conditioners. When performing the shutdown operation, the shutdown command is issued to the air conditioners in the startup status only, and is not issued to those in the shutdown status.

15) Lock key

In the mode setting mode, press the Lock key, and the remote controller of the currently selected air conditioner will be locked/unlocked. The operation mode is: If you select single-machine setting, the operation is performed for the air conditioner of the current address only. If the remote controller of the air conditioner is locked currently, issue the lock command; otherwise, send the lock command. If you does not select the single-machine mode, and the remote controller of one or more currently selected air conditioners is locked, issue the unlock command; if the remote controllers of all currently selected air conditioners are in the non-locked status, issue the remote controller lock command. When the remote

controller of the air conditioner is locked, the air conditioner does not receive remote control signals from the remote controller or wire controller until the remote controller is unlocked. Press the Query key and then press the Lock key, and the keys of the centralized controller will be locked or unlocked. If the keys are currently locked, press the foregoing keys concurrently again, and the keys will be unlocked; if the keys are currently unlocked, press the foregoing keys concurrently, and the keys will be locked. If the keys are locked, pressing of any key other than the Unlock key will be ineffective.

In the unified setting page, press the Up key and the Lock key concurrently to lock all air conditioner mode in the network. The mode locking is cancelled when the key is pressed again.

Note:

When you lock or cancel locking, the corresponding icon indication appears or disappears only after all the air conditioners in-service are set completely, as a result, it take a while to finish the mission. When the air conditioners in-service is many, wait patiently.

16) Confirmation key

In the setting mode, press the key to send the currently selected mode status and the auxiliary function status to the selected air conditioner, and display the mode setting operation results.

After you select the operation mode and auxiliary function status information of the air conditioner, if you do not press the confirmation key, the selected information will not be sent to the air conditioner, and will not affect the current operation of the air conditioner.

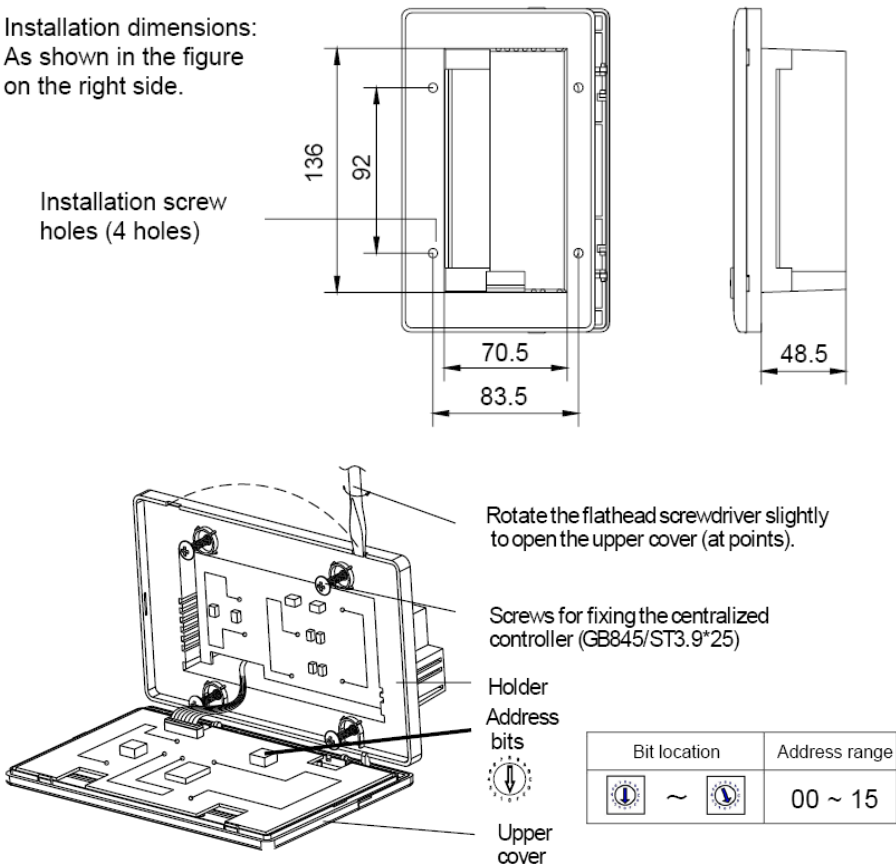
The operations of remote controller locking and unlocking do not need pressing the confirmation key. The command information is sent directly after the locking key is pressed.

17) Reset key

Anytime when the reset key is pressed, the centralized controller will reset. The result is the same as the result of restoring power-on after power failure.

2.4.1.3 Installation

Installation dimensions:
As shown in the figure on the right side.

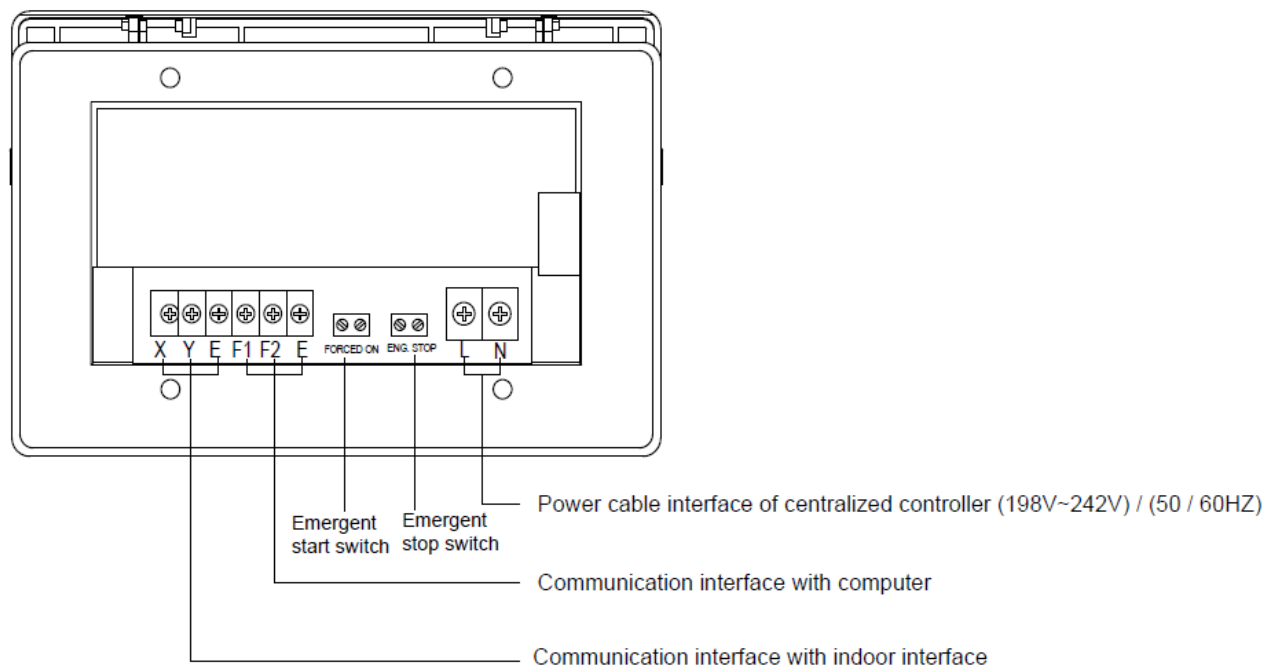



Note: To differentiate each centralized controller, the controllers in the same RS-485 net should be with

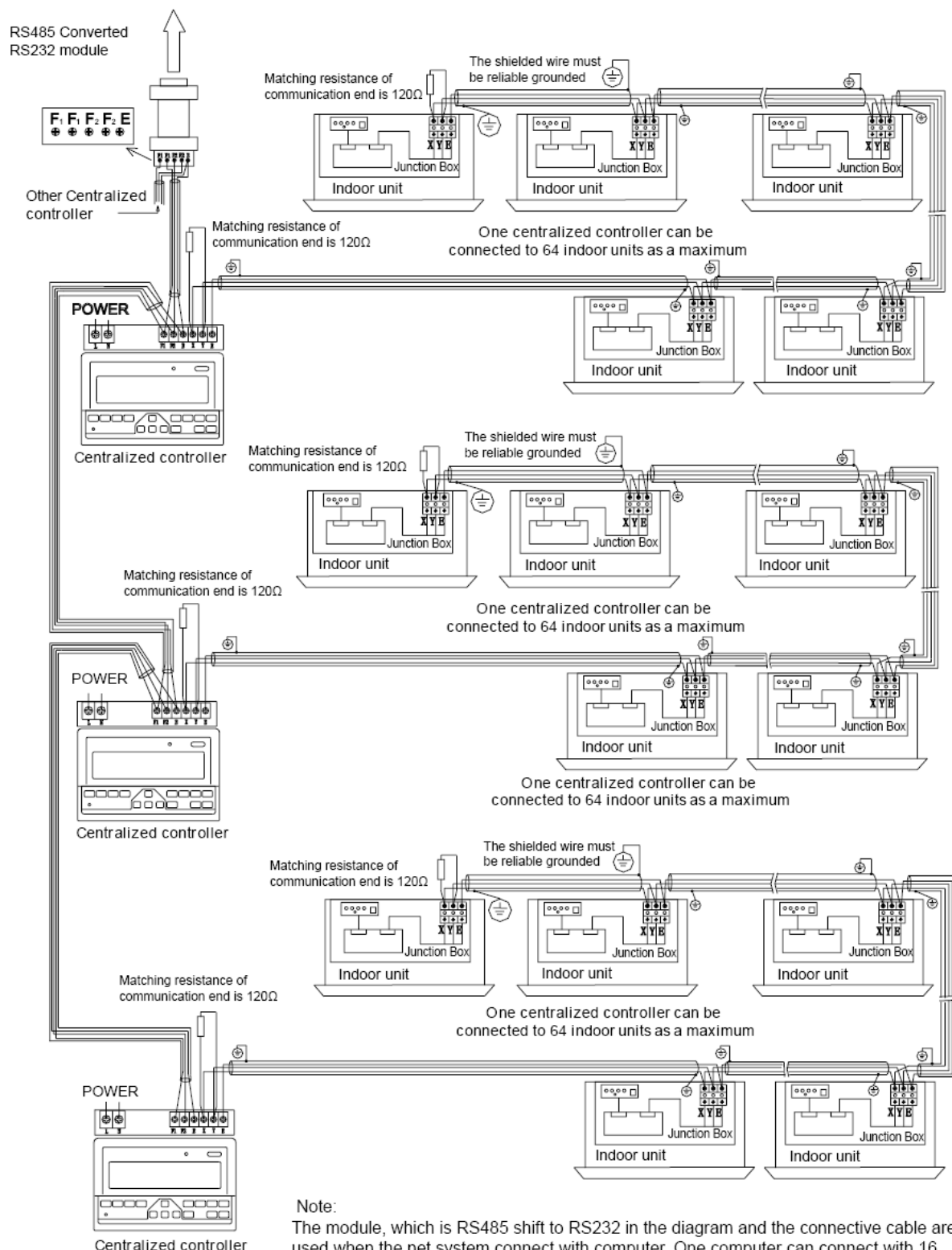
48
System

Electric and Control

different address with each other.

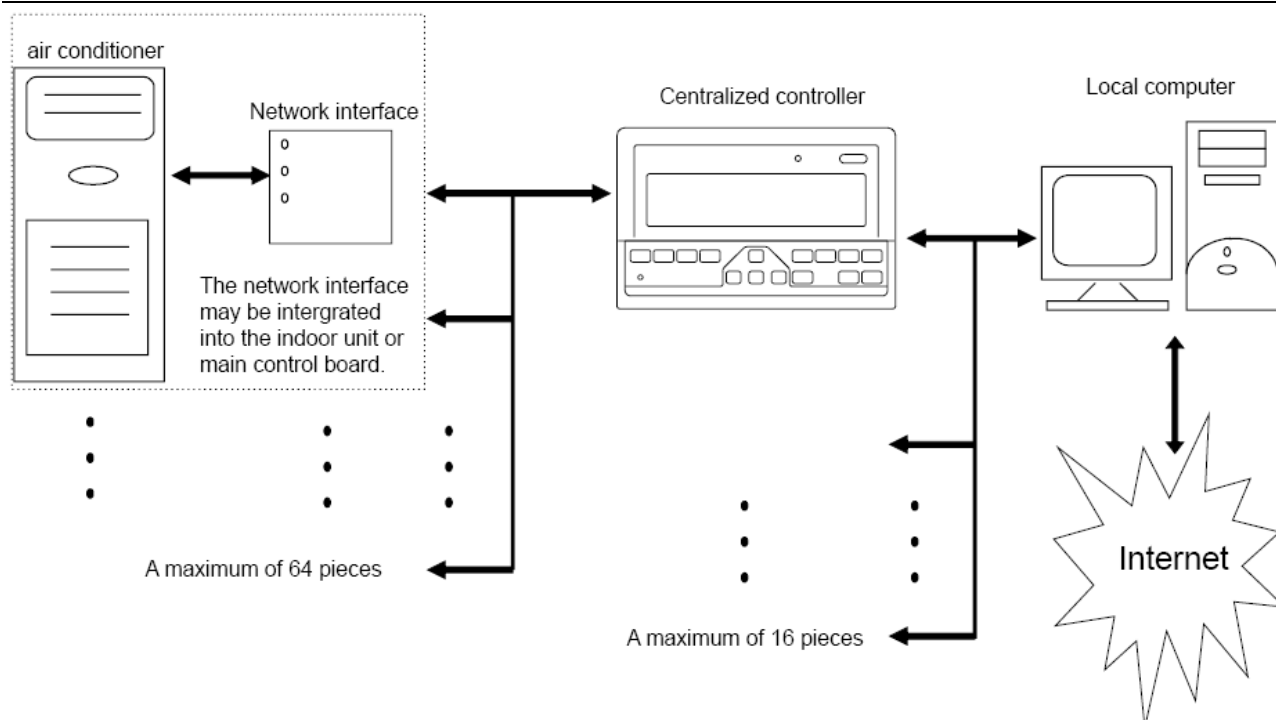


RS232 Pin hole: for connection to computer COM port 



Note:

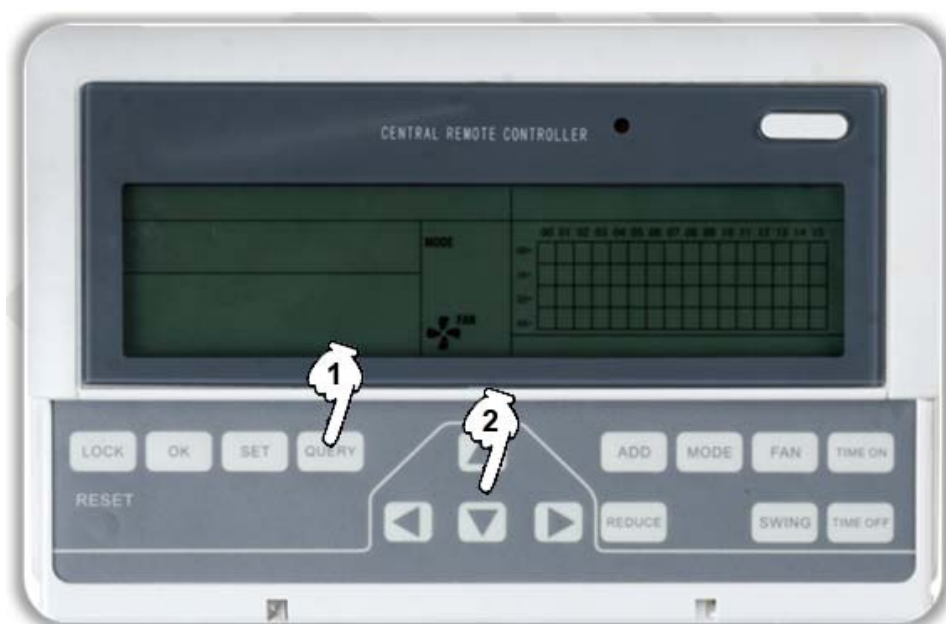
The module, which is RS485 shift to RS232 in the diagram and the connective cable are only used when the net system connect with computer. One computer can connect with 16 centralize controllers, namely $16 \times 64 = 1024$ indoor units could be controlled at mostly. The centralize controller to be distinguished by dial code address, the address setting range is from 0 to 15, thus in a network system without two centralize controller could be set in a same address.



Before starting the net work, please confirm that every CCM03's address is different with each other.

2.4.1.4 Query and Error code

The CCM03 centralized controller offers the function of query of indoor units' running state and displays the error code when some of the indoor units fail down.



1. Press the query button to activate the query function. Firstly the display panel will display the 1st units' state.
2. Use the UP, DOWN, LEFT, RIGHT buttons to select the unit we want to query.

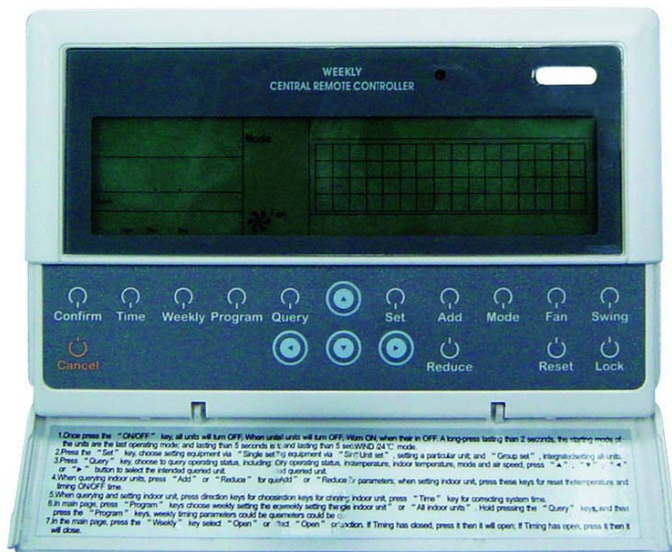
The indication of error codes are as the 2 tables below:

Fault code	Content
EF	Other faults
EE	Water level detection faults
ED	Outdoor unit fault
EC	Cleaning fault
EB	Inverter module protection

EA	Current of compressor is too large (4 Times)
E9	Fault of communication between main board and display board
E8	Wind blowing speed is out of control
E7	EEPROM error
E6	Detection of current direction alternating is abnormal
E5	T3 or T4 temp. sensor of discharge of compressor fails down
E4	T2B sensor fails to work normally
E3	T2A sensor fails to work normally
E2	T1 sensor fails to work normally
E1	Communication fault
E0	Phase sequence disorder or loss of power phase
07#	
06#	
05#	
04#	
03#	Communication mistake between centralized controller and PC(gateway)
02#	Communication mistake between centralized controller and functional module
01#	Communication mistake between centralized controller and network interface module
00#	Communication mistake between network interface module and main control board

Protection code	Content
PF	Other protection
PE	Reserved
PD	Reserved
PC	Reserved
PB	Reserved
PA	Reserved
P9	Reserved
P8	Compressor's current is too large
P7	Voltage of power supply is too high or too low
P6	Pressure of discharge is too low
P5	Pressure of discharge is too high
P4	Temp. of discharge pipe is abnormal
P3	Temp. of compressor is abnormal
P2	Condenser high-temperature protection
P1	Anti cool air or defrost protection
P0	Evaporator temperature protection

2.4.2 Weekly schedule timer central controller MD-CCM09/E



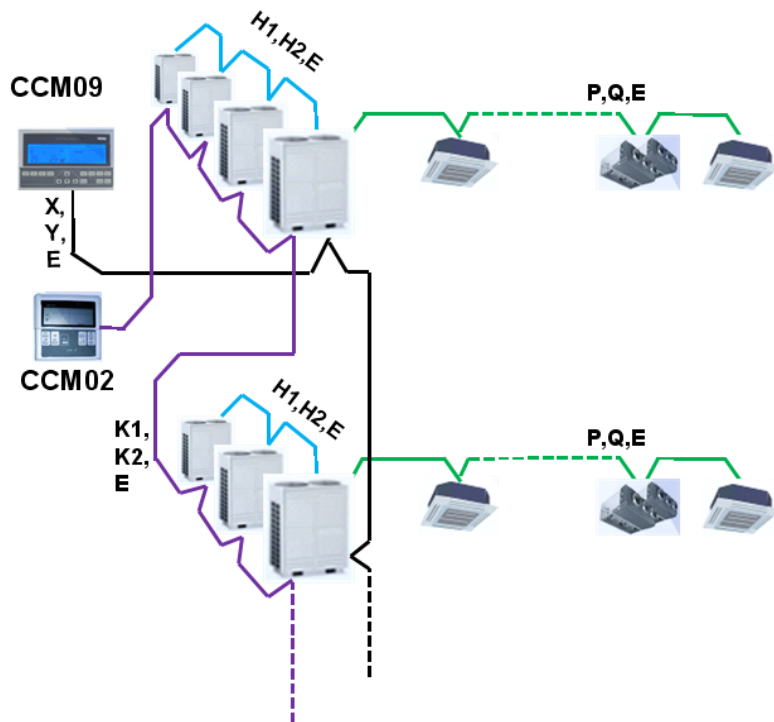
MD-CCM09/E is designed base on the CCM03, max. 64 indoor units control, weekly schedule timer function. With the function above, CCM09/E can't be connected to the network control system. And actually it dose not have the port F1, F2, E, which are needed if connects to the computer.

- 7 -days Weekly schedule setting (Maximum 128 weekly & daily schedules)
- Max. 64 indoor units group control or individual setting
- Clear and bright screen with LCD backlight
- Temperature setting
- Wireless remote control restriction
- Sleep and Silent mode
- Mode lock
- Permanent schedule setting storage

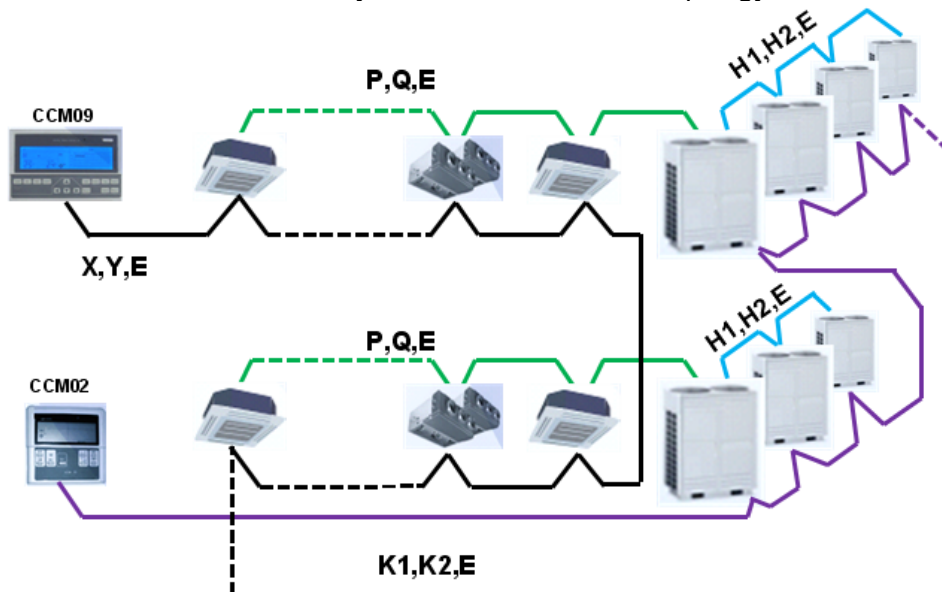
2.4.2.1 System configure

MD-CCM09/E is only a indoor units centralized controller, but with this device we could set the indoor unit's functions compactly and conveniently.

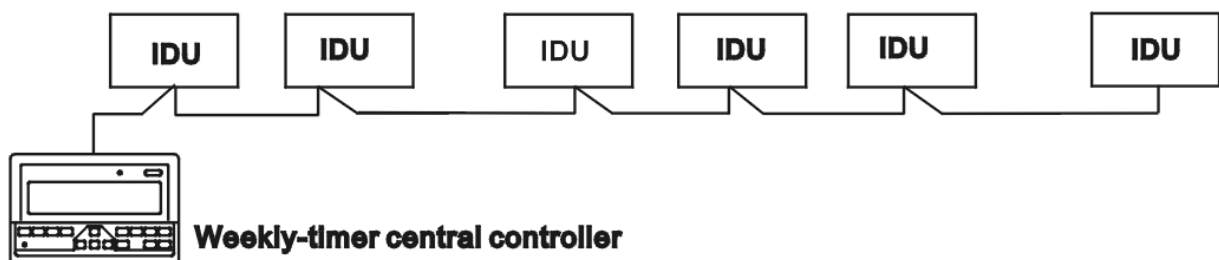
1. All the indoor units and outdoor units are V4+ series, the topology of the network can be as follows. Moreover the 2nd way of connecting is also adaptable in this condition.

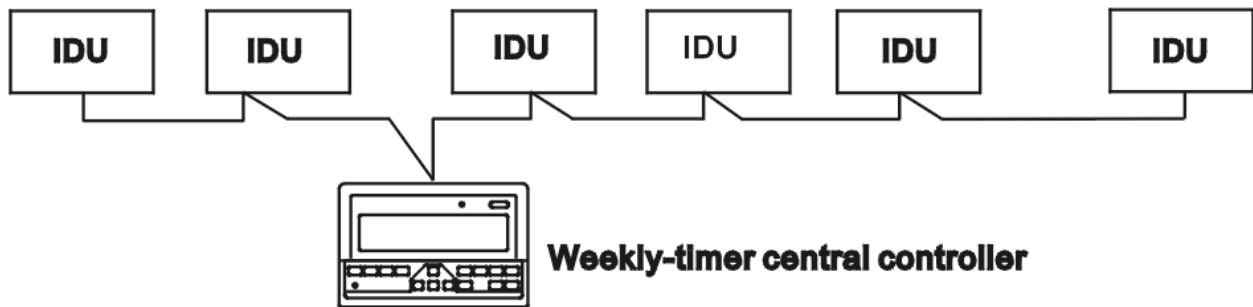


2. The indoor units contains any V4 series, the network topology is as follows.

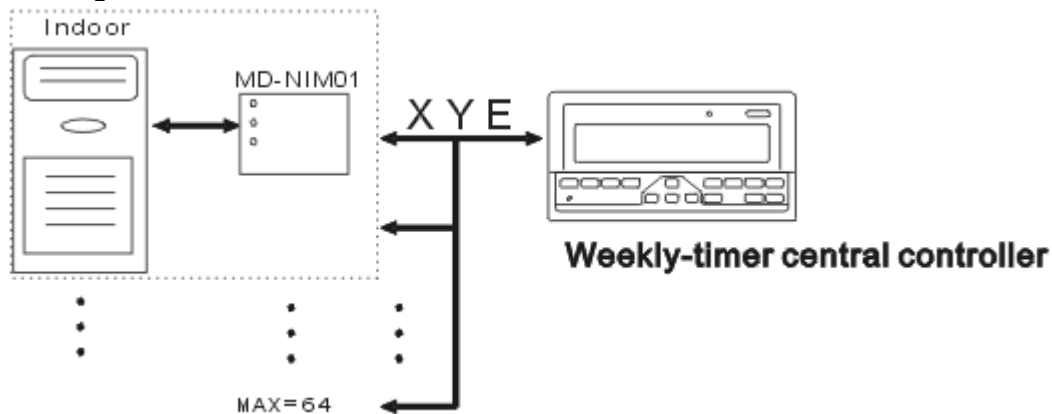


MD-CCM09/E controller needs connecting it with other indoor units in a hand-in-hand way, which is the same connecting way with MD-CCM03. For the 2nd type of topology, either of the connecting ways below is available.





Expansive Function: MD-CCM09/E is also can be connected to the Network module MD-NIM01, which can assign an network address the indoor unit with this function.

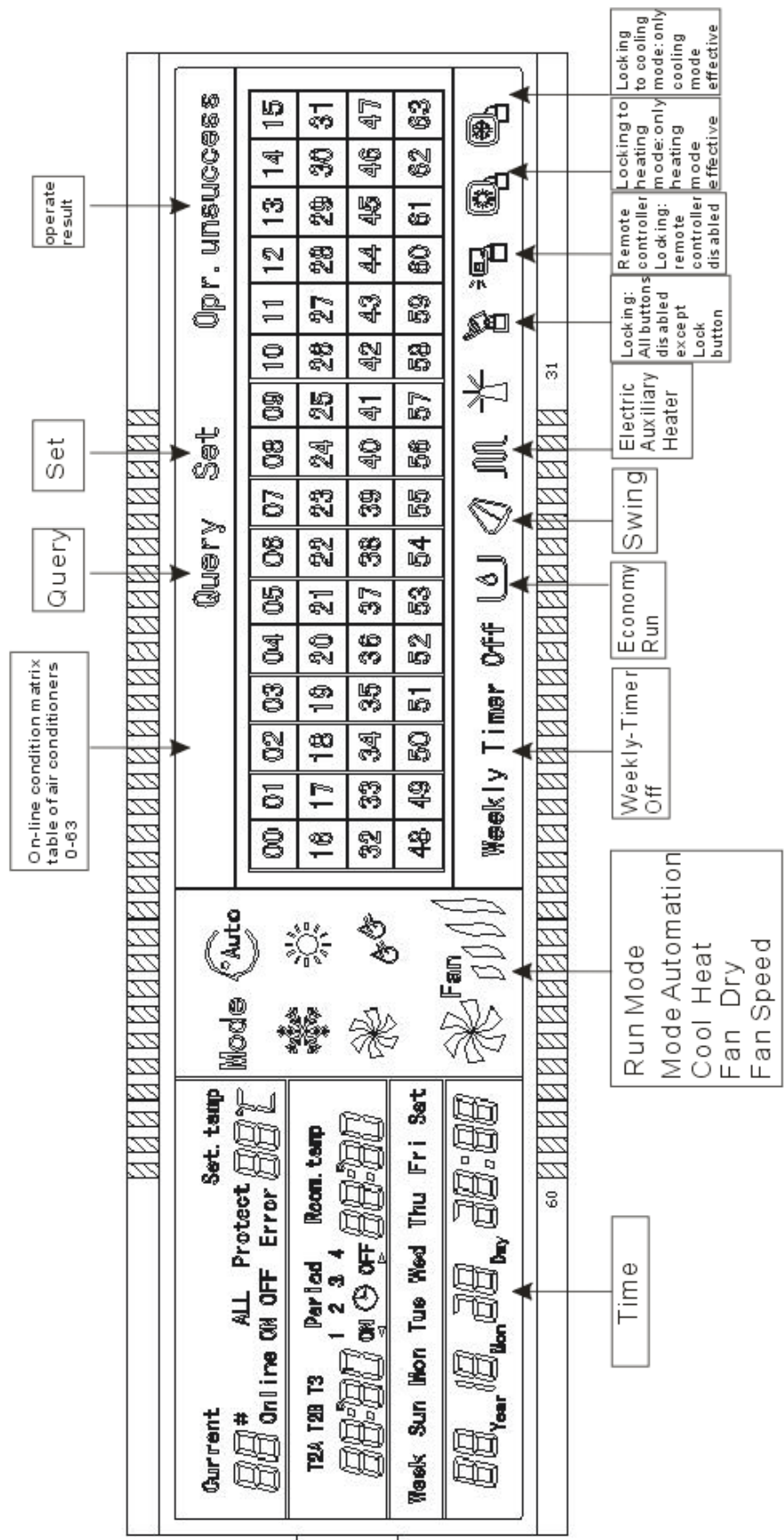












To establish a steady network the following should be noted

- Directly connect 20V~50/60Hz power supply to ends L and N of the socket on the back of the central controller.
- The signal cable and power cable of the central controller cannot be contained in the same cable tube. The distance between the signal cable tube and power cable tube shall be between 300mm -500mm at least.
- The total signal cable length of the central controller shall not exceed 1,200m.
- Make sure there is no joint in the middle of the shielded cable. If such a joint exists, use a socket to connect.

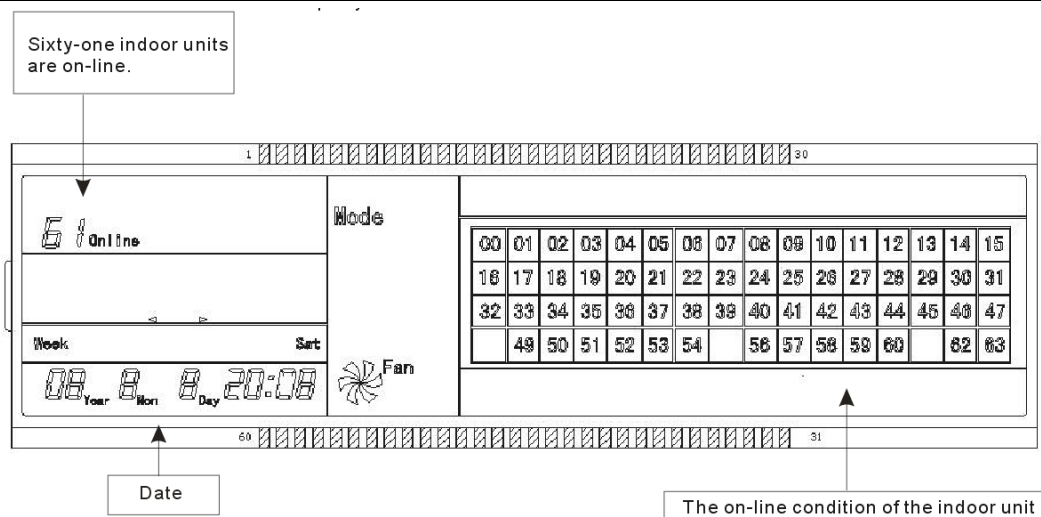
2.4.2.2 Description Names and Functions

Full display of LCD



Icon	Meaning	Icon	Meaning
	Auto mode		Fan only mode
	Cooling mode		Dry mode
	Heating mode		Fan speed
	Electric auxiliary heating		Heating mode only
	Cooling mode only		Wireless controller lock
	Lock keyboard	Set	Set mode
Query	Query mode	Opr. unsuccess	Operating result
Weekly Timer Off	Weekly timer off	ALL	All units are selected
Online	Online status	Protect	Protection code follows
Error	Error code follows	Set. temp	Set temperature
Period 1 2 3 4	Corresponding period	Room. temp	Room temperature
T2A	Temp. of the middle of evaporator	T2B	Temp. of the outlet of the condenser
T3	Temp. Of outdoor pipe	Mon	Monday
Tue	Tuesday	Wed	Wednesday
Thu	Thursday	Fri	Friday
Sat	Saturday	Sun	Sunday

Display panel indications

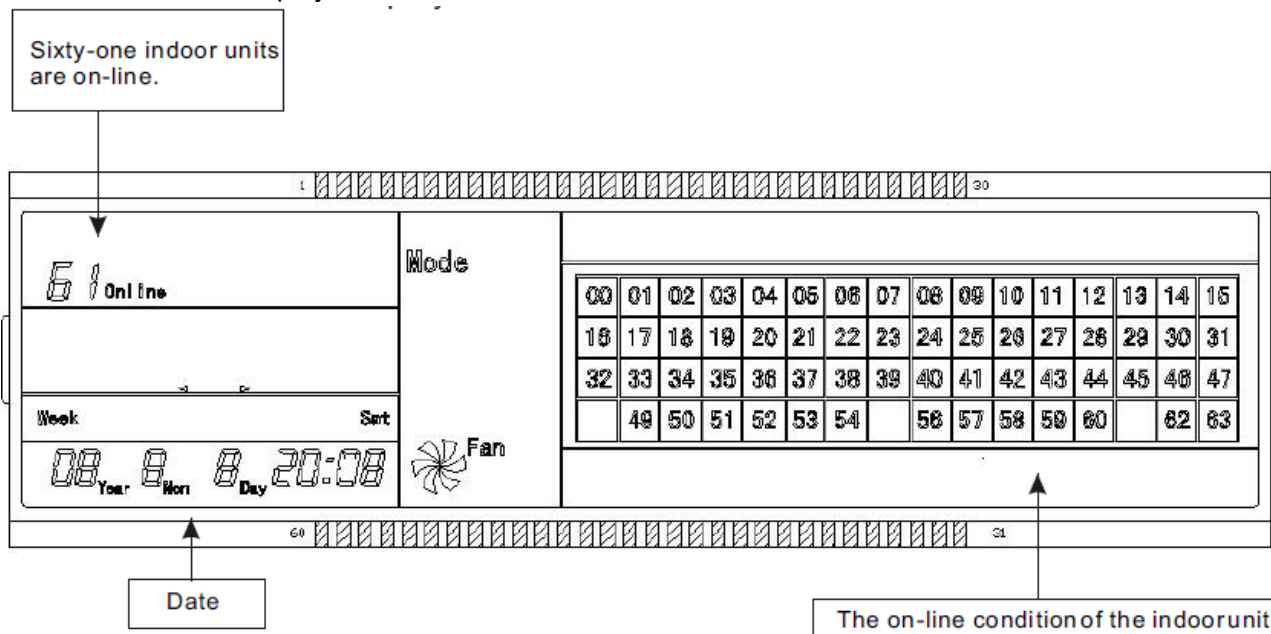


1) The main interface of the weekly-timer central controller (user interface)

Under the other pages, press "CANCEL" to return to the main interface.

Under the other pages, automatically return to the main interface when no operation for a period of time.

The main interface displays the on-line condition of the indoor unit.

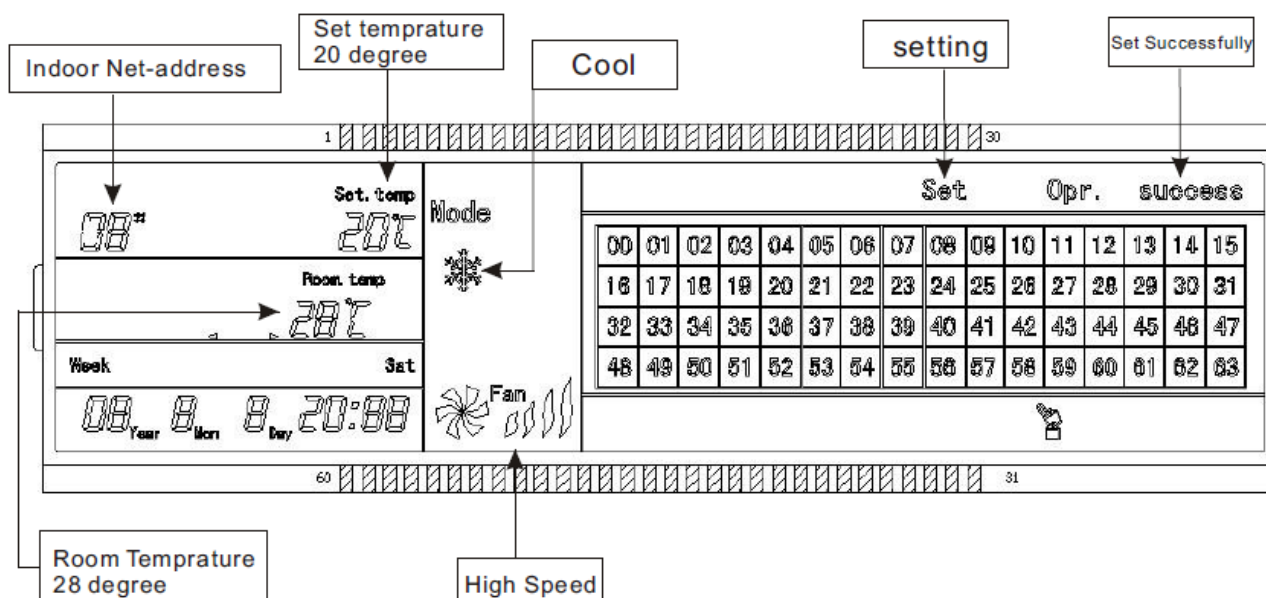


2) Setting interface of single weekly-timer central controller

Under the main interface, press to select to the single setting interface

Automatically return to the main interface when no operation for a period of time.

Set the running status of single air conditioner under this page.



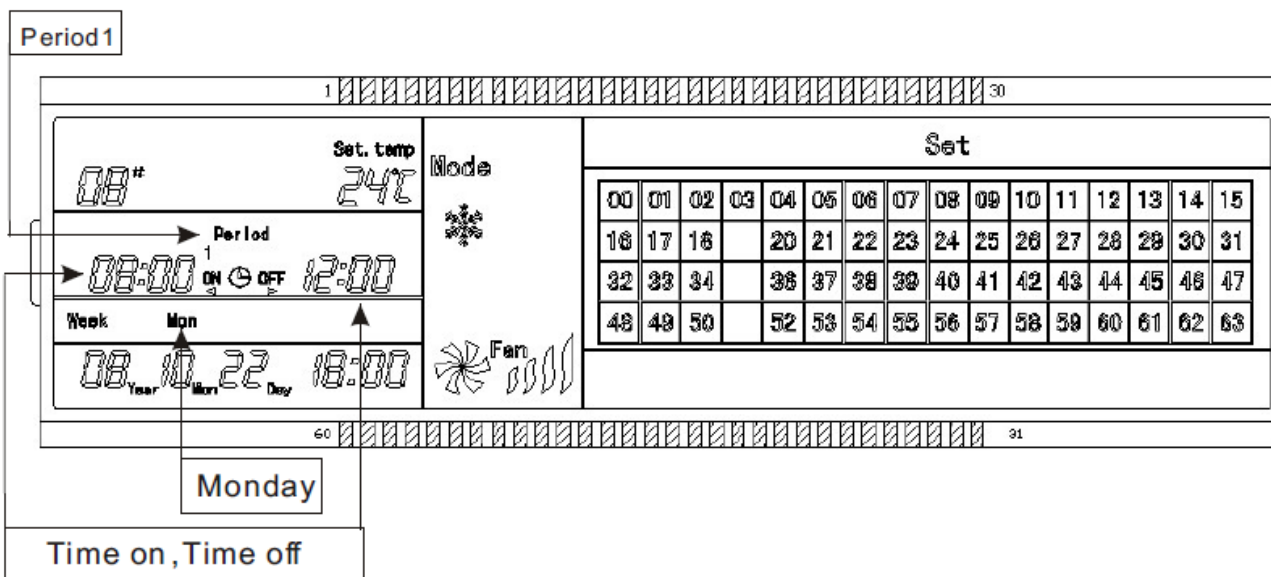
3) Setting interface of weekly timer parameters of single weekly-timer central controller

Under the main interface, press to display the parameter setting interface of single weekly timer

Automatically return to the main interface if no operation is performed for a period of time.

Under this page, set the weekly timer parameters of single air conditioner, including startup time, shutdown time, the running mode of this period, temperature and wind speed.

One air conditioner can be at most set with four periods in one day from Monday to Sunday, seven days in total.

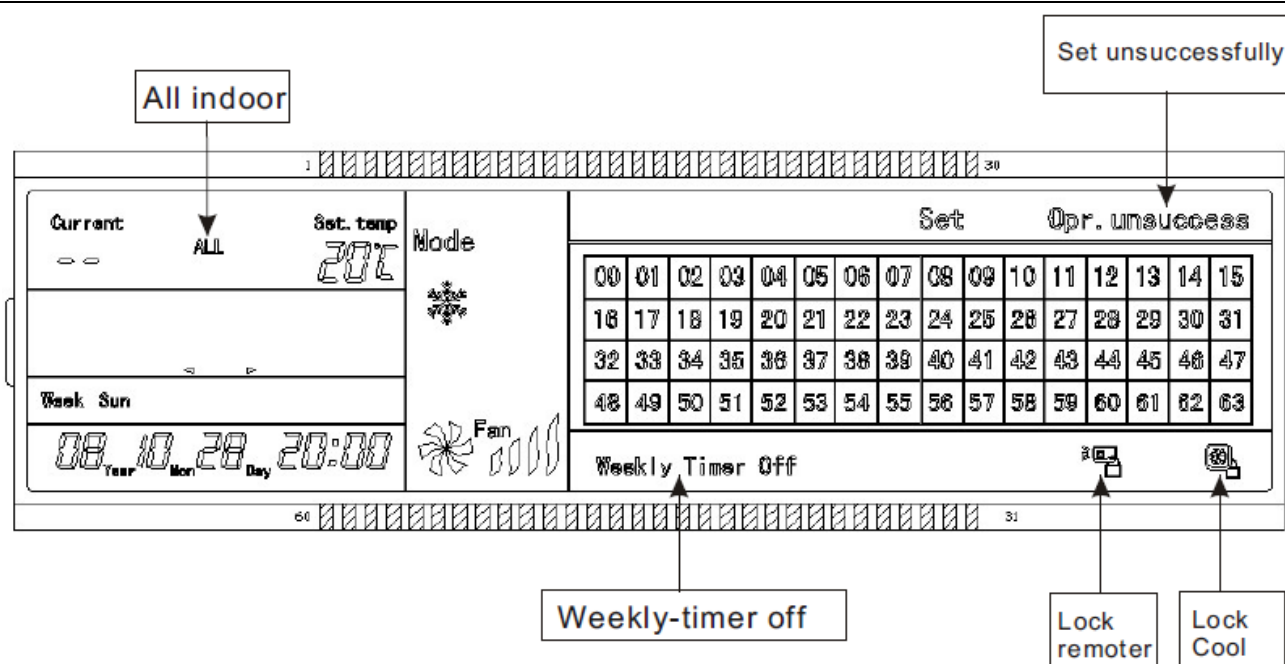


4) Unified setting interface of the weekly-timer central controller

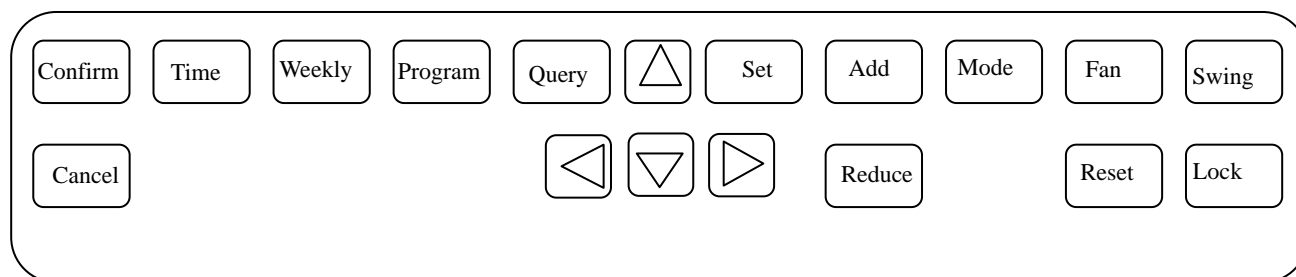
Under the main interface, press "SET" to display the unified setting interface.

Automatically return to the main interface if no operation is performed for a period of time.

Set the running mode of all air conditioners under this page, including mode, temperature and Fan speed.



Keyboard panel and button functions



1) On/Off key

Press the ON/OFF button. All air conditioners will be shut down if they are running, on the contrary, they will be started up. If you press the button for less than 5 seconds, the startup mode is the last running mode of the air conditioner. If you press the button for more than 5 seconds, the startup mode is cooling, fan runs at high Speed, and the set temp. is 24 degrees.

2) SET key

Press the SET button, and then select set single or set all. Set single indicates to set the parameter (such as mode/ temperature/Fan speed/ weekly timer) of an single selected air conditioner. Set all indicates to set the parameter of all air conditioners controlled by the central controller.

3) Query key

Press the Query button to query the running condition of the air conditioner, such as on of off, temperature setting, indoor temperature, fan speed and running mode. Press direction keys to select the air conditioner that you want to query.

4) Up, Down, Left, Right keys(Direction keys)

When querying or setting the indoor units, press these four keys to select the indoor units that we need to set or queried. When setting the weekly timer, it is used for selecting the day of the week and the time of startup and shutdown.

5) Add key

When querying the indoor unit, press the Add button to query more parameter of the indoor unit. When setting the indoor unit, it is for adjust the setting temperature. When setting the weekly timer, it is for adjust the time of startup and shutdown.

6) Reduce key

When querying the indoor unit, press the "Reduce" button to query more parameter of the indoor unit. When setting the indoor unit, it is for modifying the setting temperature. When setting the weekly timer, it is for modifying the time of startup and shutdown.

7) Mode key

When setting the indoor unit, it is used for setting the running mode of the indoor unit which includes Automation, Cooling, Heating, Fan mode, Dry and shutting down.

8) Fan key

When setting the indoor unit, it is for setting the wind speed of the indoor unit which includes high speed, middle speed, low speed and automatic speed.

9) Swing key

In setting the indoor unit, it is for setting the swing function of the indoor unit. The running modes are swing on or swing off.

10) Lock key

When setting, press the Lock button to lock the remote controller of all or single indoor unit. Press the Query button and hold under the main page, then repress the Lock button again to lock the keyboard of the central controller; press the Mode button and then press the Lock button again to lock the running mode.

11) Reset key

The central controller re-scans the indoor unit in the network as recharging after power off.

12) Program key

Under the main page, press the Program button to set the weekly timer of single indoor unit or all indoor units. Press the Query button and hold, and then press the Program button to query the weekly timer parameters of the indoor unit.

13) Weekly key

Under the main page, press the Weekly button to start up or shut down the weekly timer function.

14) Time key

Under the main page, press the Time button for 5 seconds to enter the time-modifying status, and then press Add or Reduce button to change the setting time. Press Left or Right to select minute/ hour/ day/ month/ year. Finally, press the Confirm button to save the modification.

15) Confirm key

Save data and send the command required to the indoor unit, such as setting the mode of the air conditioner.

16) Cancel key

Cancel the last operation and return to the last interface.

2.4.2.3 Installation of CCM09

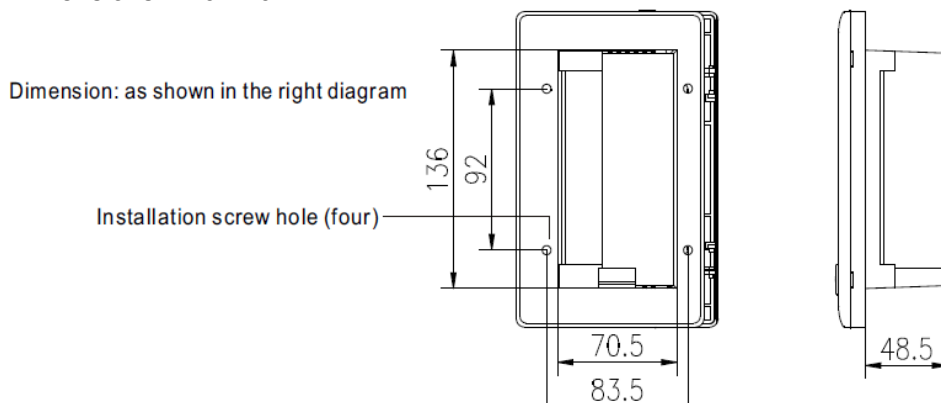
Installation

The installation method of the central controller using electrician switch case

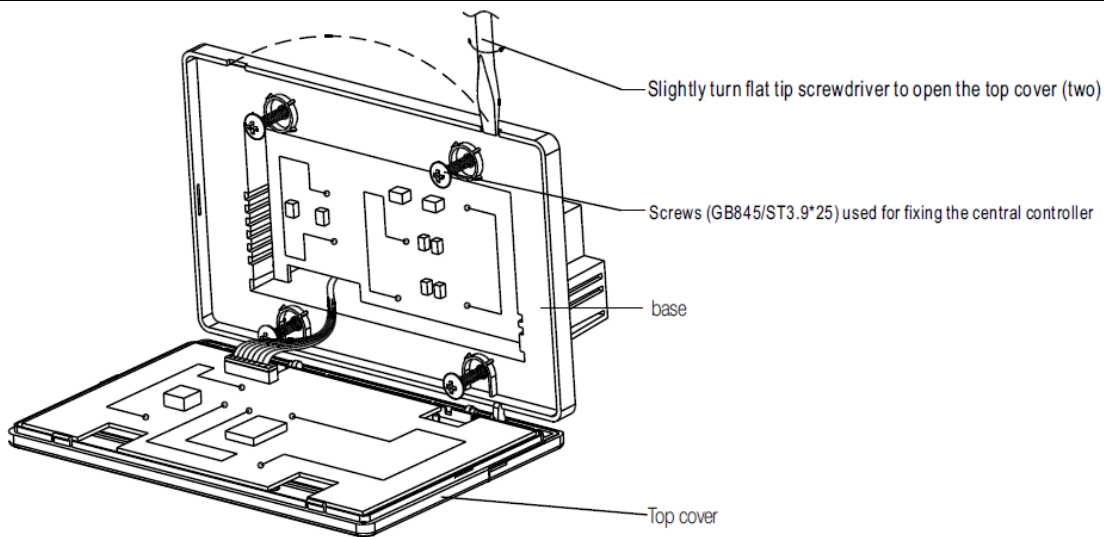
The thickness of the central controller cable shall be adjusted according to the length of the cable. A proper cable tube shall be used to install the cable of the central controller.

Insert the flat tip screwdriver into the recess on the top panel of the case and slightly turn to open the top cover of the central controller.

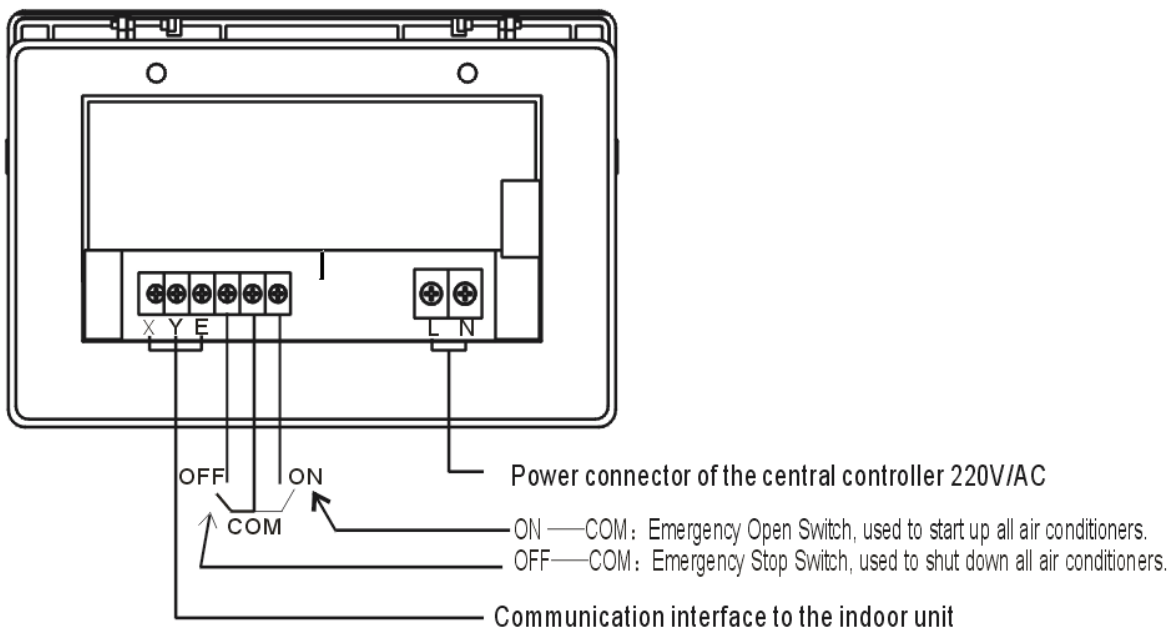
Dimensions: 170*110*71mm



Ways to open the shell and fix the controller

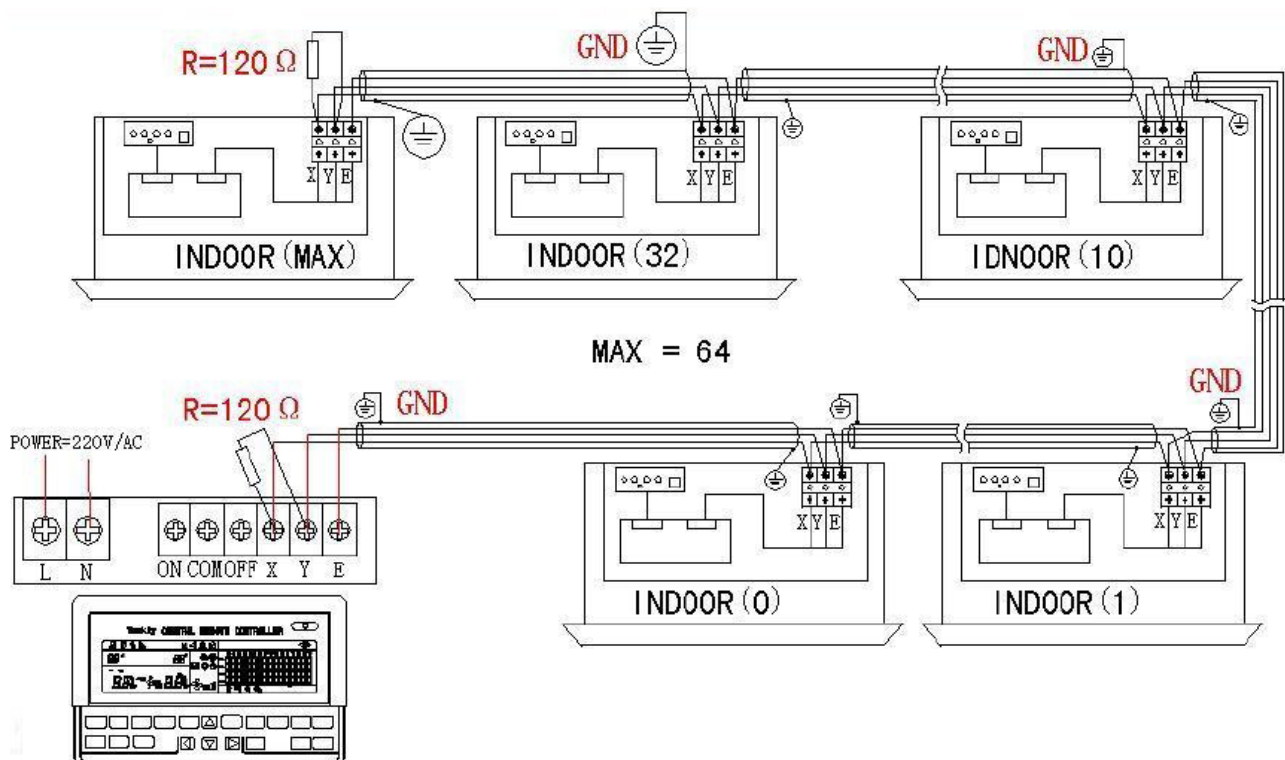


Ports of the controller



Wiring Diagram Map

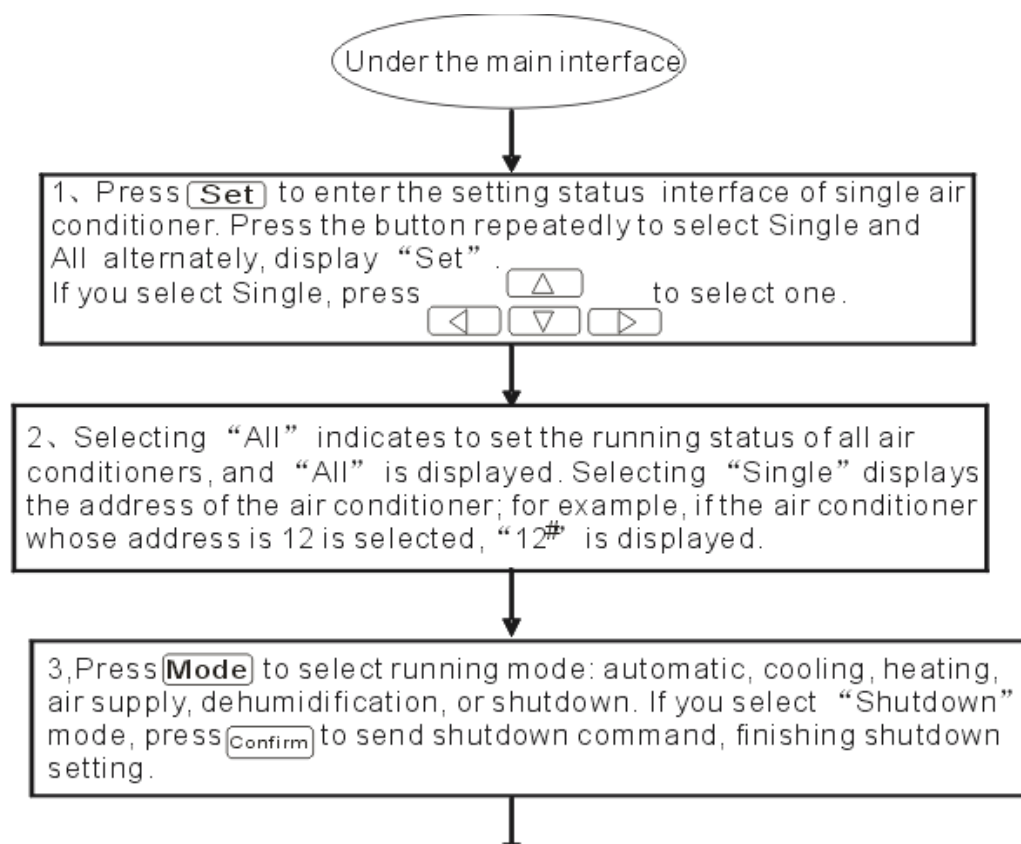
Connecting diagram of network-based air conditioning system (There are two types of indoor units, namely indoor unit with external network interface module on the main control board or built-in network interface module in the main control board.)



Connecting diagram for air-conditioning system with central network

2.4.2.4 How to use

1) How to set the running status of the air conditioner



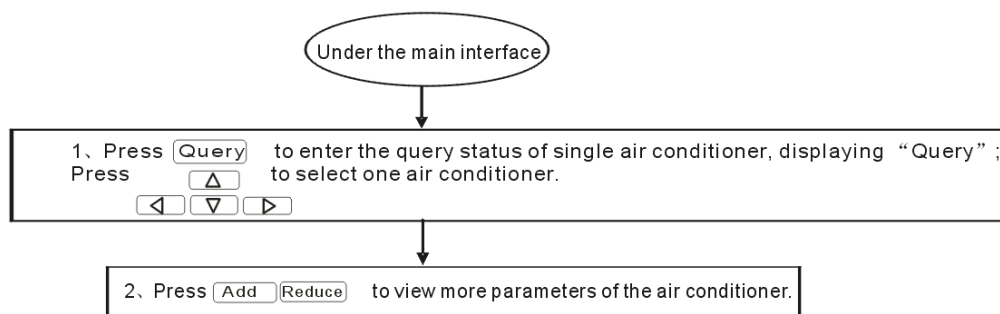
4、If you select the cooling or heating mode, press **Add** **Reduce** to adjust the temperature (the scope is within 17-30 degree). No temperature adjustment for other modes.

5、Press **Fan** to regulate wind speed, which can be selected among automatic speed, low speed, middle speed and high speed.

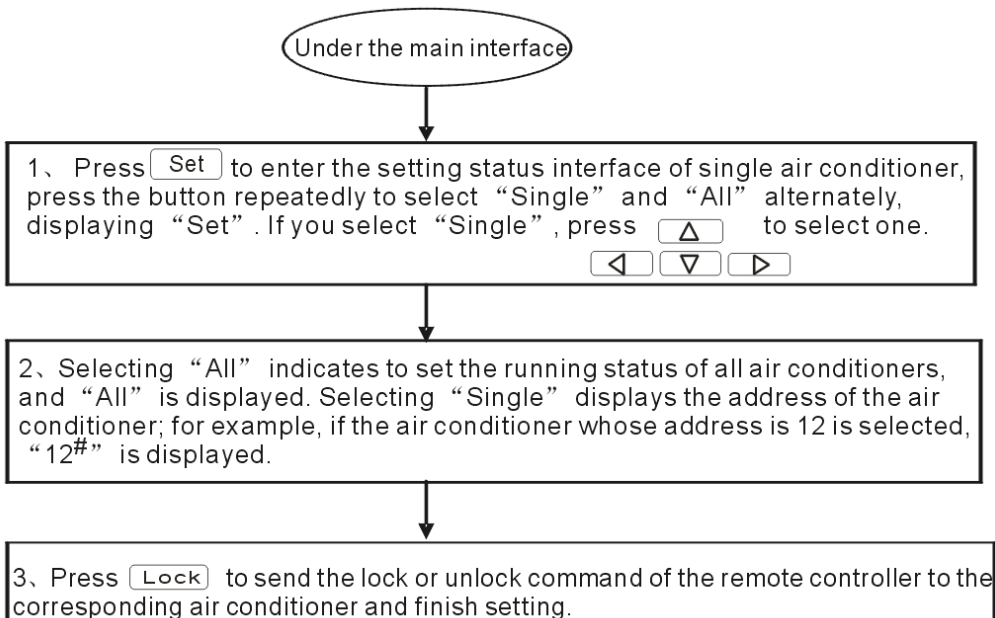
6、Press **Swing** to open or close swing.

7、Press **Confirm** to save the above setting and send to the corresponding air conditioner, finally finish setting.

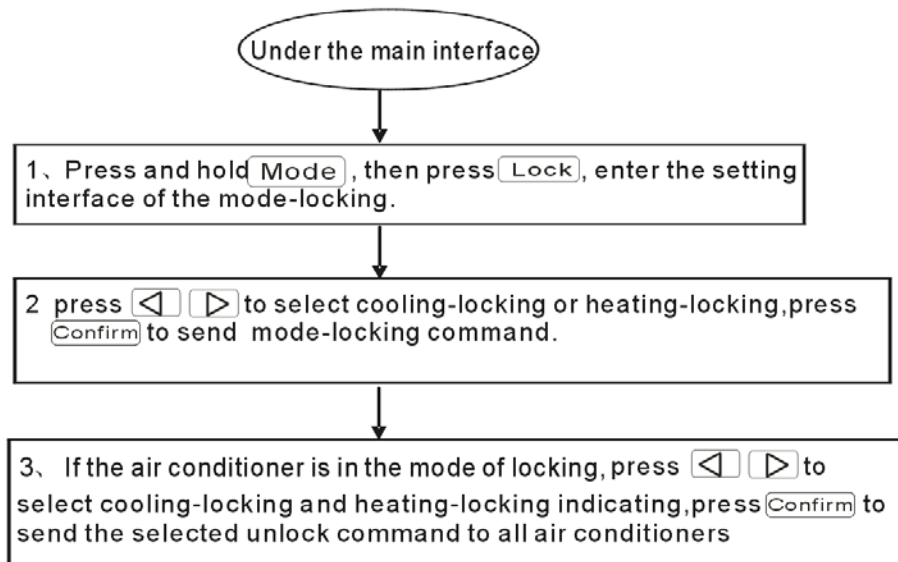
2) How to query the running status of the air conditioner?



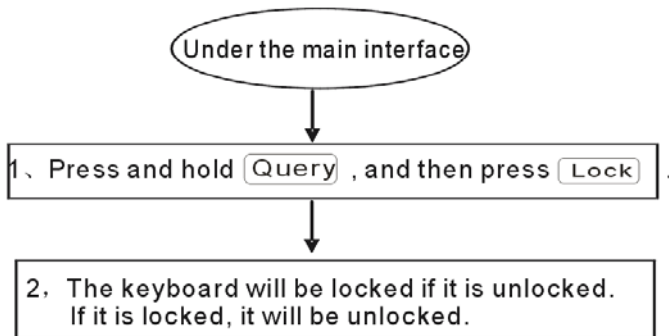
3) How to lock and unlock the remote controller of the air conditioner?



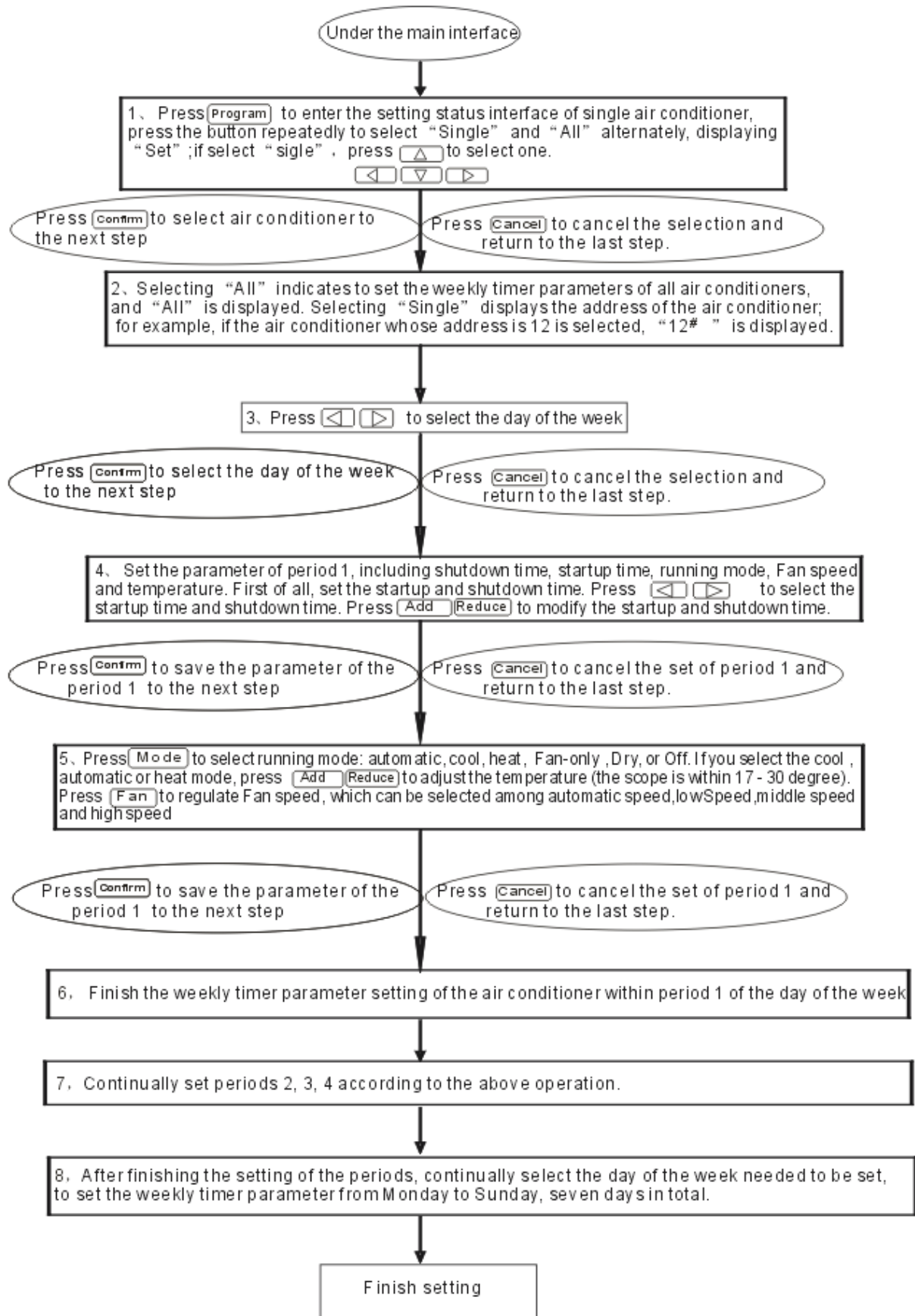
4) How to lock and unlock the mode of the air conditioner?



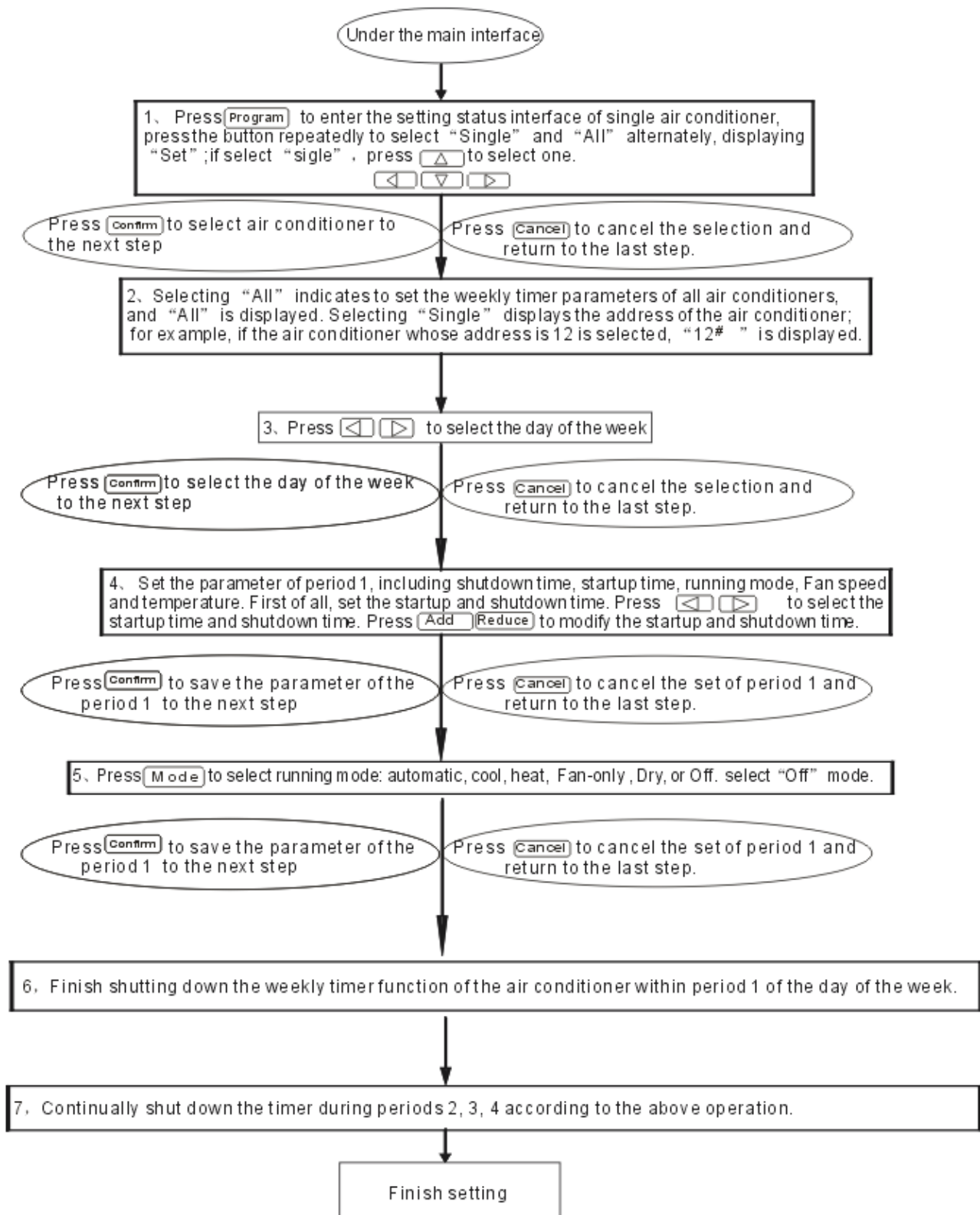
5) How to lock and unlock the key board of the weekly-timer central controller?



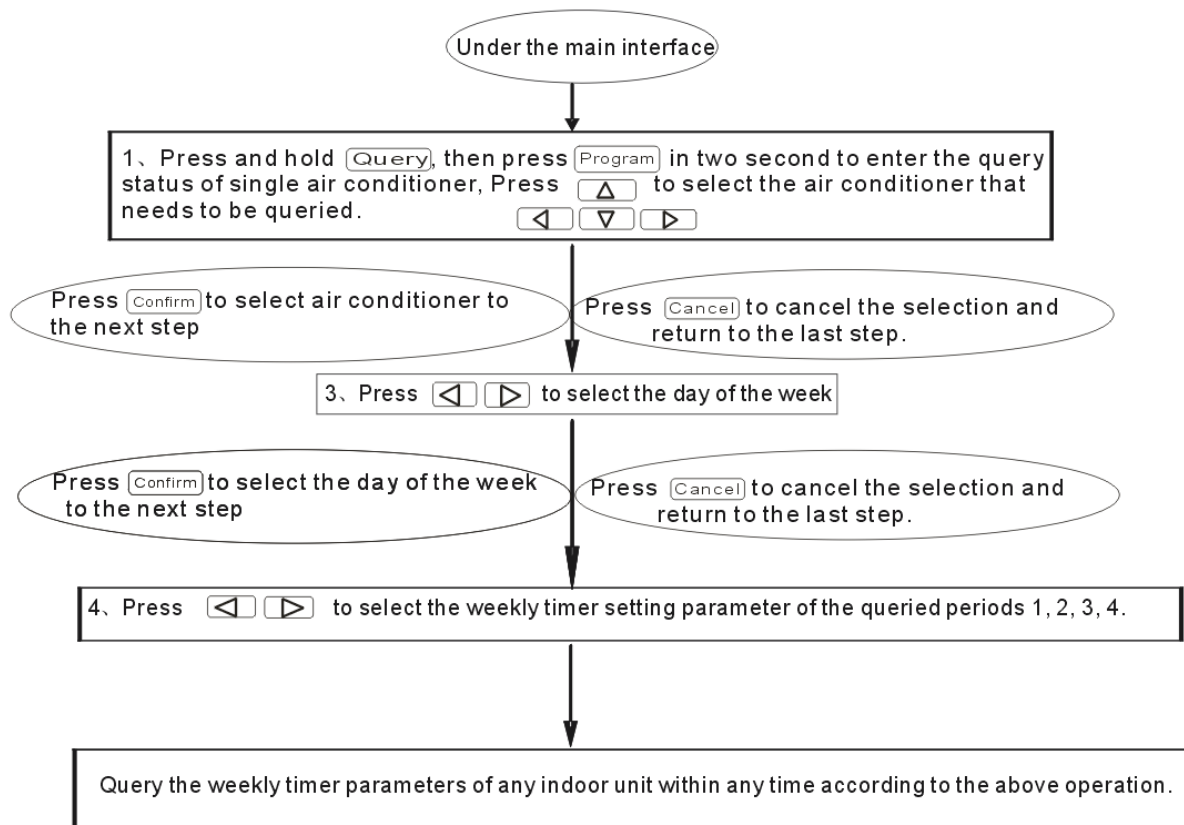
6) How to set the function and relevant parameters of the weekly timer of the air conditioner?



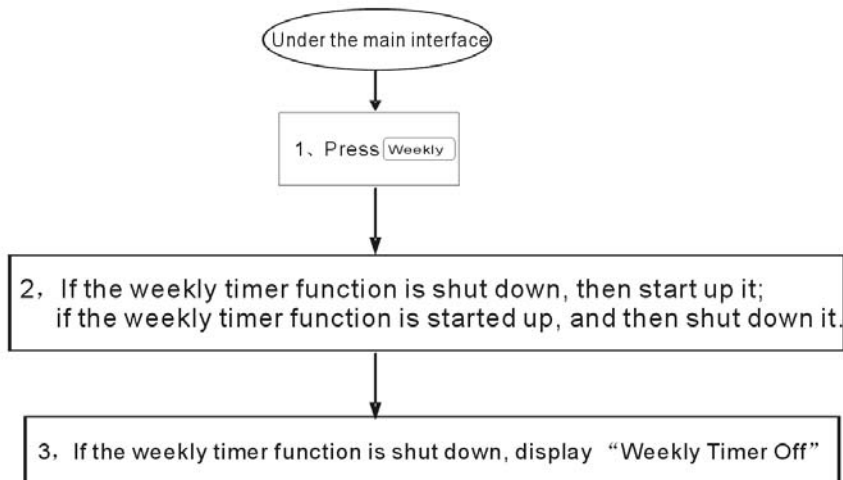
7) How to turn off the weekly timer setting of a period of an air conditioner?



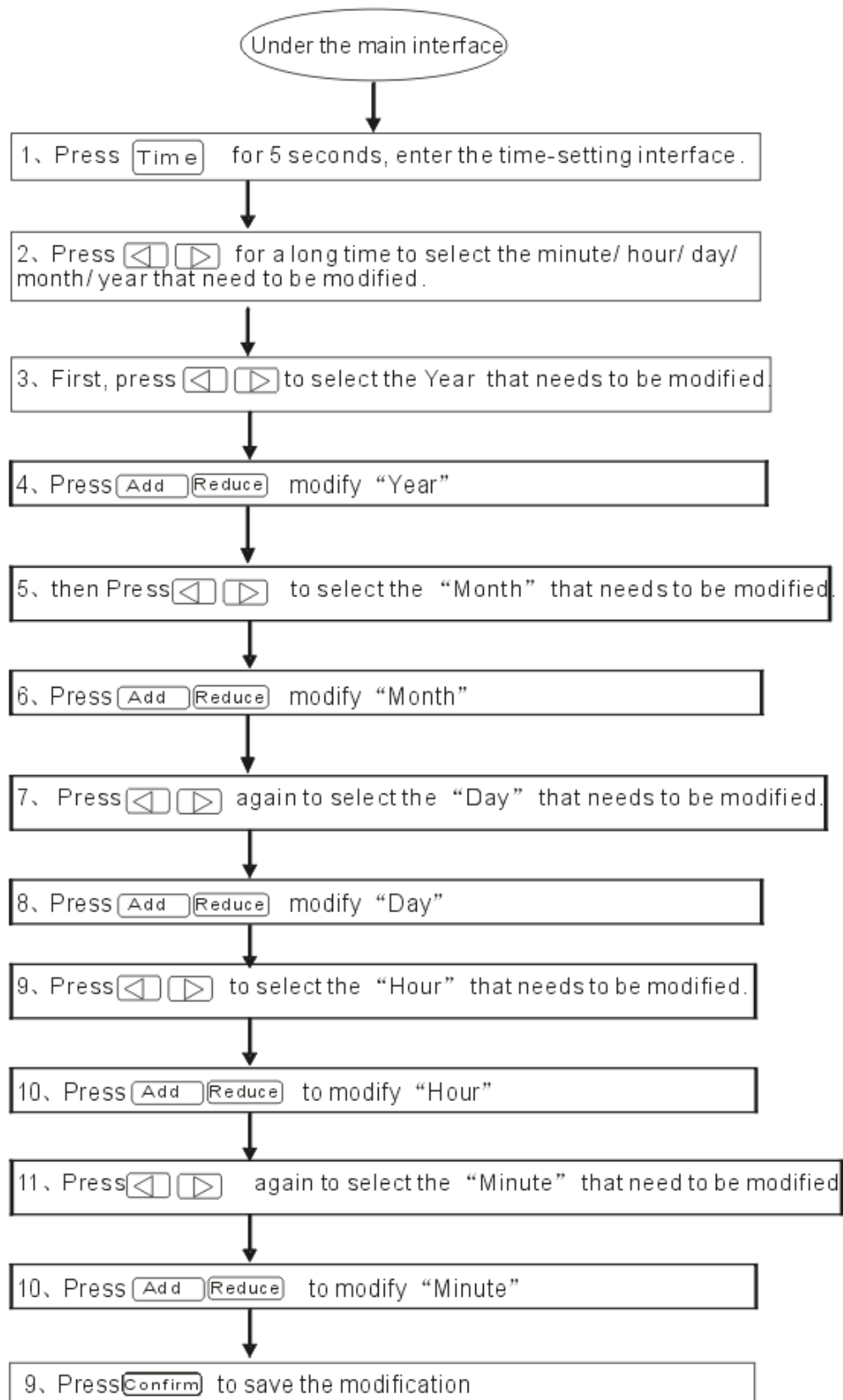
8) How to query the weekly timer setting parameter of the air conditioner?



9) How to start or shut down the weekly timer function of all air conditioner units?



10) How to adjust the system's time?



Note: There is always a time interval between 2 periods. This mean the period's off time should not be the same as the starting time of next work period. The least time interval should be 10 minutes, or the units cannot work as our intentions.

Error codes and protection codes tables

Fault code	Content
------------	---------

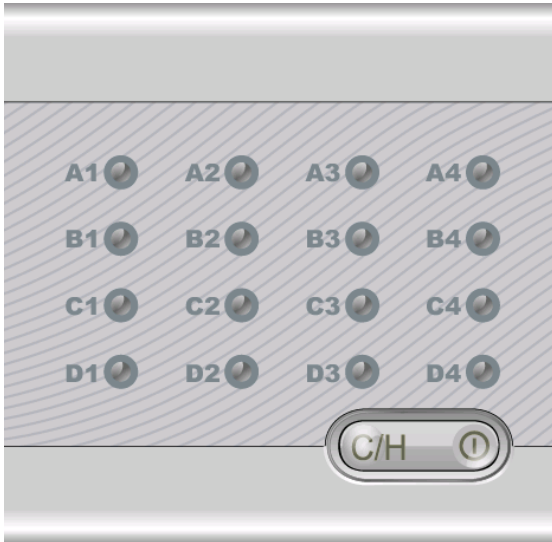
EF	Other faults
EE	Water level detection faults
ED	Outdoor unit fault
EC	Cleaning fault
EB	Inverter module protection
EA	Current of compressor is too large (4 Times)
E9	Fault of communication between main board and display board
E8	Wind blowing speed is out of control
E7	EEPROM error
E6	Detection of current direction alternating is abnormal
E5	T3 or T4 temp. sensor of discharge of compressor fails down
E4	T2B sensor fails to work normally
E3	T2A sensor fails to work normally
E2	T1 sensor fails to work normally
E1	Communication fault
E0	Phase sequence disorder or loss of power phase
07#	
06#	
05#	
04#	
03#	Communication mistake between centralized controller and PC(gateway)
02#	Communication mistake between centralized controller and functional module
01#	Communication mistake between centralized controller and network interface module
00#	Communication mistake between network interface module and main control board

Protection code	Content
PF	Other protection
PE	Reserved
PD	Reserved
PC	Reserved
PB	Reserved
PA	Reserved
P9	Reserved
P8	Compressor's current is too large
P7	Voltage of power supply is too high or too low
P6	Pressure of discharge is too low
P5	Pressure of discharge is too high
P4	Temp. of discharge pipe is abnormal
P3	Temp. of compressor is abnormal
P2	Condenser high-temperature protection
P1	Anti cool air or defrost protection
P0	Evaporator temperature protection

Note: These two tables are the same with centralized controller CCM03.

2.4.3 General controller **KJR-90B/M**

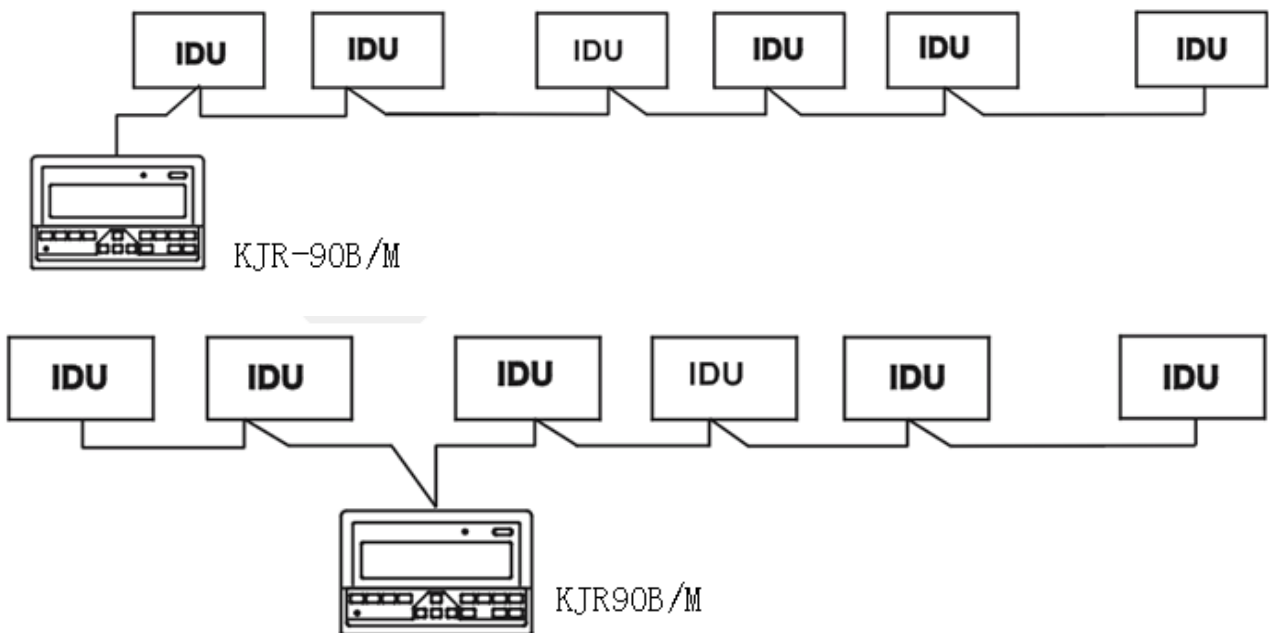
KJR-90B/M is a unified centralized controller, which allows us to control up to 16 indoor units simply and compactly. It commands the indoor unit to work at only 2 modes, cooling and heating. Besides this commanding, users could also modify the indoor units working mode by the remote wireless controller. This controller offers the controller functions only and is disable to brige the units to the PC.



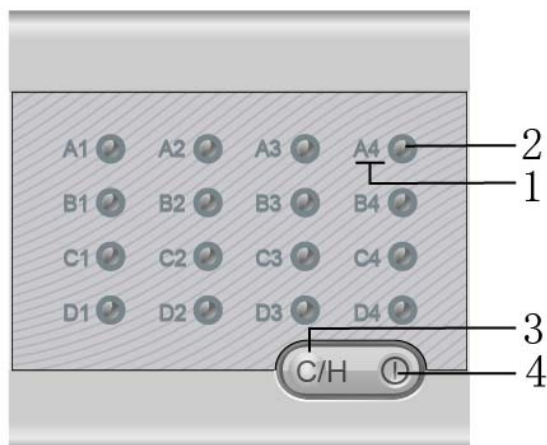
- Centralized Control
 - Short press: Only turn ON/OFF the last time operated indoor units.
 - Long press (3 seconds): Can Turn ON/OFF all indoor units.
- Operation Mode Selection Switch (Cooling, Heating)
- Overall/mono-control the indoor units
- Sleep and memory function
 - If no operation to be conducted at the controller after 25 seconds, system would enter to sleep mode, all indicators are faded. Press any key to recovery the displaying.
- Compatible with central control.

2.4.3.1 System configure

MD-CCM09/E controller needs connecting it with other indoor units in a hand-in-hand way, which is the same connecting way with MD-CCM03. Either of the connecting ways below is available.



Discription Names and Funtions



1. Corresponding indoor unit tag

Up to 16 indoor units be controlled by one centralized controller. If more than 16 indoor units, the operation would failure. Please set the indoor unit network address codes properly before use this controller. The following table show the relation between the tag and the corresponding network:

Air condition table	A1	A2	A3	A4	B1	B2	B3	B4
Network address	0	1	2	3	4	5	6	7
Ari condition table	C1	C2	C3	C4	D1	D2	D3	D4
Network address	8	9	10	11	12	13	14	15

The corresponding indication of the air conditioner reflects the working mode of its indoor unit, blue means cooling or air supply mode, red means heating mode.

2. Single indoor unit On/Off key

Users could press this key to turn on or turn off the corresponding indoor unit. If the indoor units original mode is on, press this would turn it off. And vice versa. The interval between controlling 2 different unit should be more than 0.6 second. If less, the operation is invalid and of no use.

Note: 1. If the red light flashes quickly, it means the corresponding indoor unit malfunctions.

2. If no one press the keys of the controller, the controller would turn itself into power saving mode, in which all the lights fade out. Press any key to stop this mode.

3. Unified mode setting key

Press this key to set all the units' mode. Only two mode can be set by this key. They are the cooling mode and the heating mode. The details of the two mode are as follows:

	Temperature	Fan Speed	Key light
Cooling mode	20°C	Hi speed	Blue
Heating mode	28°C	Hi speed	Red

Note: The interval between these two mode alternating should be more than 6 seconds. If less, the alternating would be invalid and of no use. When the indoor unit's working mode is changed by other device, such as remote controller, this centralized controller could detect, and change the corresponding units tag to show the actual running mode.

4. Unified On/Off key

This key has 2 ways to send commands:

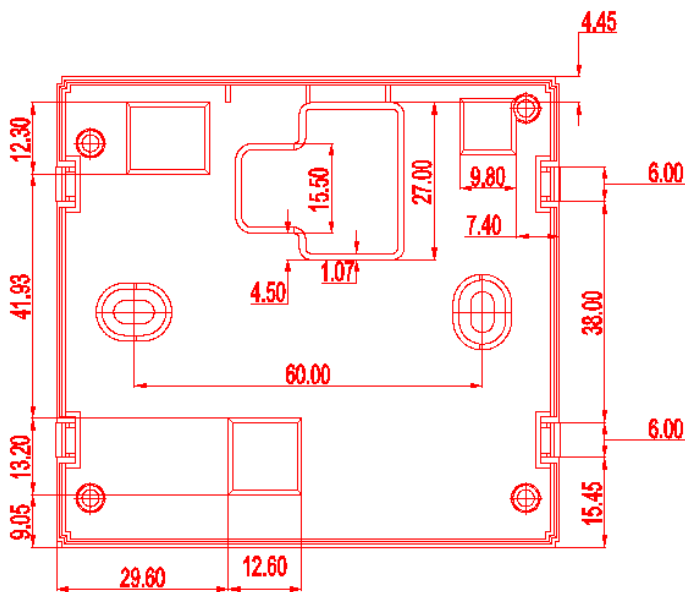
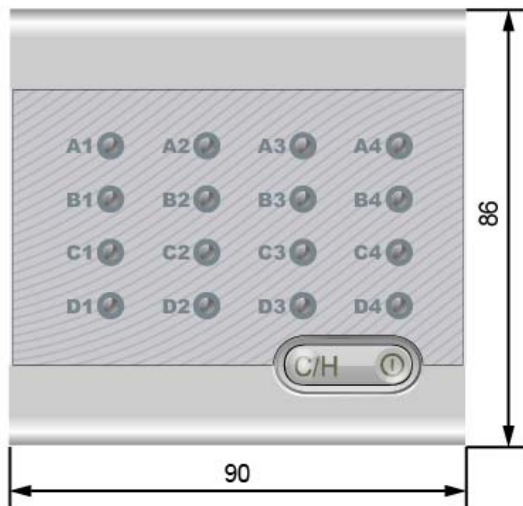
Press for 3 seconds or more: To turn on or turn off all the indoor units that are connected to this controller.

Press for less than 3 seconds: to turn on or turn off the single unit that we ever controlled most latterly.

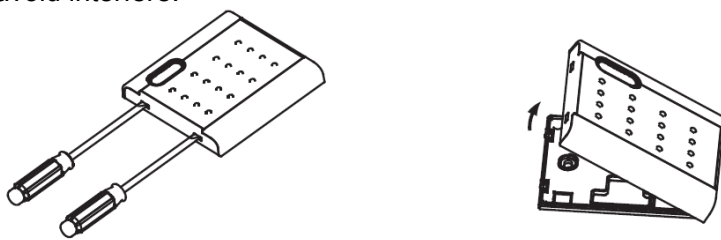
Note: If this key's light flash quickly, it means that the EEPROM malfunctions.

2.4.3.4 Installation of KJR-90B/M

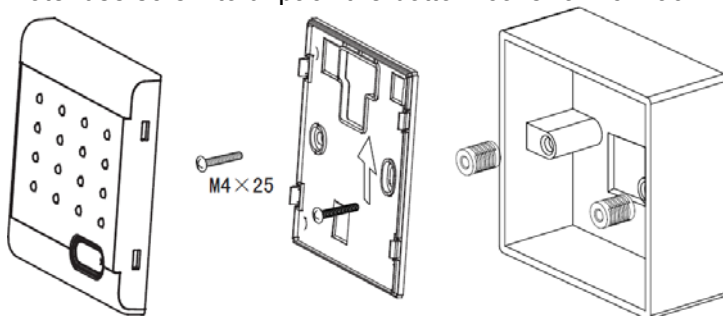
Dimensions: 90*86*8mm



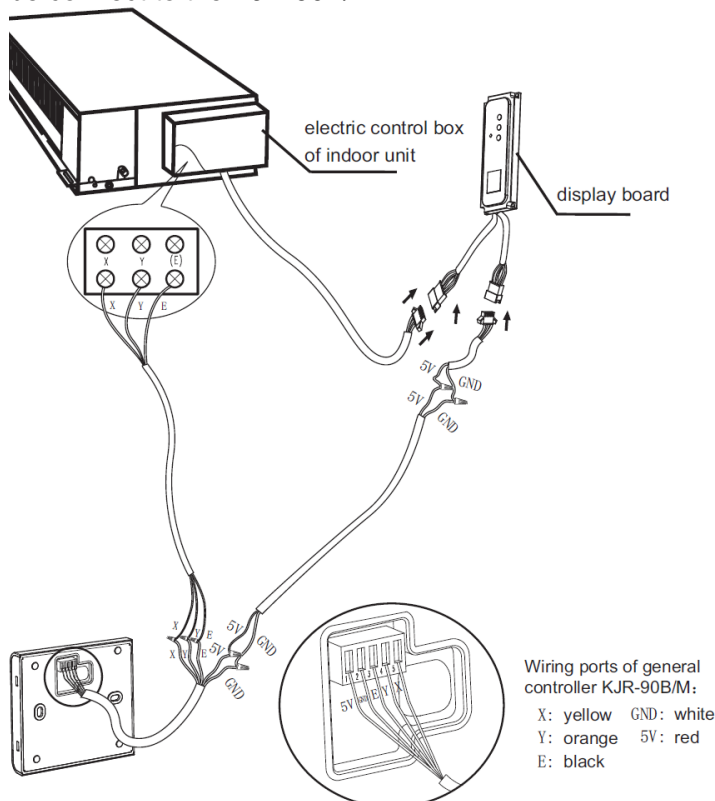
- 1) Please correct to connect the 2-core and 3-core shielded wire to imbed the wall.
- 2) When no less than 3 pieces of KJR-90B/M install nearly, please keep over 2m distance each other to avoid interfere.



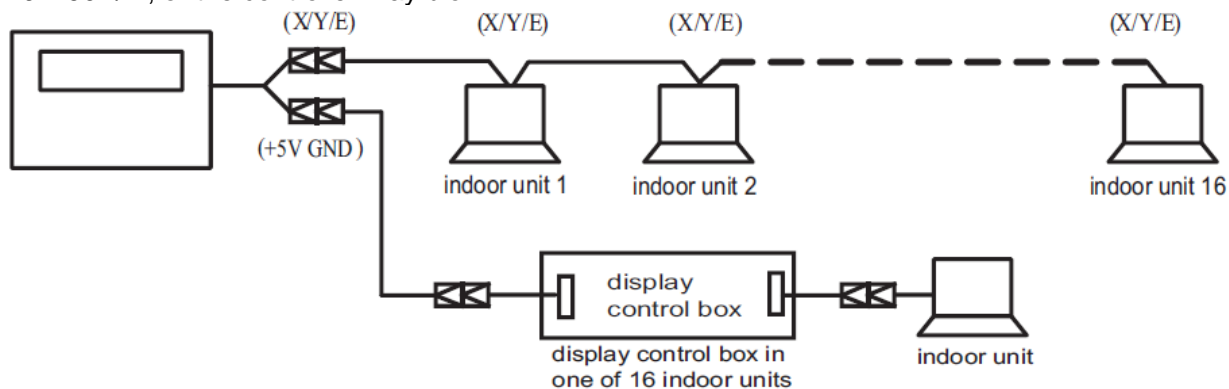
Note: use screw to unpack the bottom cover of KJR-90B/M.



KJR-90B/M should be connect in a hand-in-hand way to the indoor units. It does not contains power transforming function, so this controller should obtain 5V power from the indoor units display panel. In fact, the display panel usually has a port in which two of pins are the 5V and GND. These two pins can be connect to the KJR-90B/M.



Note: KJR-90B/M uses a DC 5V power. Remember do not connect strong electricity power to KJR-90B/M, or the controller may blow.



Note:

- 1) KJR-90B/M connects max. 16 indoor units; otherwise the operation is invalid.
- 2) Please correctly set network address of indoor unit, and refer to the address table above.
- 3) Any 2 indoor units' network address cannot be same; otherwise system will detect only one of them.

2.4.3.4 Lights displays and error code

Light	Blue	Red	Flash
Single On/Off key	Cooling/Fan	Heating	IDU Error
Unified On/Off key			EEPROM Error

2.4.5 Central control monitor **MD-CCM02/E**

MD-CCM02/E is a control monitoring device used to monitoring the outdoor units' status. Moreover, MD-CCM02 is able to bridge the outdoor units to the gateway, and then realize the BMS monitoring, which makes the building management visible and one-station.

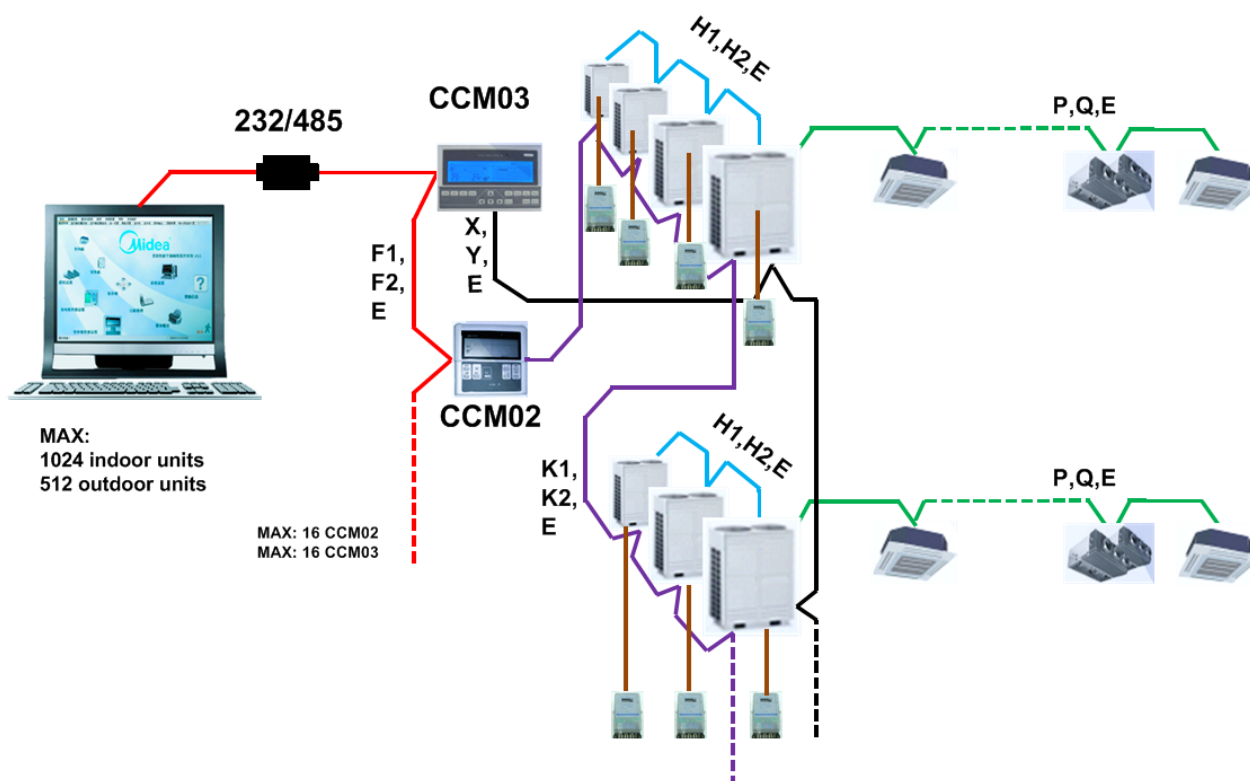


- RS485 communication protocol
- Up to 8 systems, max.32 outdoor units can be centralized monitor
- It can display the operating parameter of outdoor units
- It can display the error or protection code of outdoor units

2.4.4.1 System configure

With MD-CCM02/E, we could both centrally display the outdoor units' running status and bridge up to 32 outdoor units to the PC monitoring software or BMS--Building Management System. In fact, for the purpose of connecting the indoor units to the PC or the gateway, which makes the outdoor units visible on the display panel, MD-CCM02/E is necessary.

The location of CCM02 in the network is as follows.



To establish a steady network the following should be noted

- The signal wire should be 3-core shielded wire and the wire should be provided by licensed electricians.
- To make signal transmission steady and to protect the facilities, the signal transmission wires should not be near to the power line. An interval of 300mm-500mm should exist between these two kinds of wires.
- The signal wire of each network should be less than 1,200m.
- The unit and the centralized controller should be connected hand-in-hand, which means that all the units' same port should be connected to a 3-core wire and the signal wire should be linear in topology. Or else, the facilities could not work normally.

2.4.5.1 Description of Names and Functions

Key Words and Basic Functions

After the CCM is power on or reset, all the segments on LCD will be displayed and last for 3 seconds. And then disappear for 2 seconds. After this, the controller's system runs at normal display mode, in which CCM would display the main page.

Network Area Address Setting

Up to 16 CCM02 can be connected to the gateway or the PC. Each CCM02 can be view as a secondary or sub-net of the network and distinguish themselves by their unique address. The address can be set in the key panel and it ranges from 16-31.

Address setting method:

To differentiate the CCM02 and CCM03, the addresses of CCM02 range from 16-31. Every time we press the address button of a CCM02, the corresponding CCM02's address increase by 1. When the address come to the end 31, press the key again could make the address back to the starting address 16.

Indicator Display

Indicator light will be on when the CCM02 is powered on.

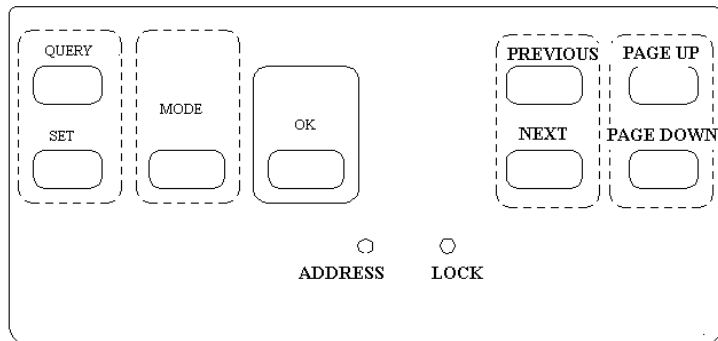
CCM02 LOCKED

Press this button to start the lock mode. In lock mode, all the buttons cannot lock, except the LOCK button. Press LOCK button again to cancel this mode.

Electricity consumption query

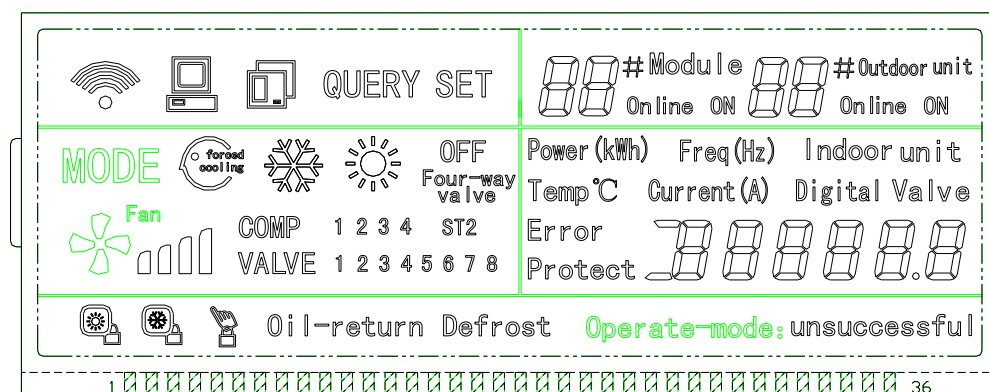
CCM02 allows user check each outdoor units' electricity consumption. To realize this function, each outdoor unit should be installed with an ammeter. The ammeter DTS634/DT636 can be purchased from Midea Company.

Buttons and Functions




- 1) **QUERY:** Push it to enter into the query state
- 2) **PREVIOUS:** On the query state, press it to query in default the running status of a previous online air conditioner.
- 3) **NEXT:** On the query state, press it to query in default the running status of a previous online air conditioner.
- 4) **PAGE UP:** Press the PAGE UP button when choosing an online air conditioner on the query mode to display the parameters in previous page.
- 5) **PAGE DOWN:** Press the PAGE DOWN button when choosing an online air conditioner on the query mode to display the parameters in next page.
- 6) **SET:** Press SET button to enter into Set Page.
- 7) **MODE:** Pressing MODE button to enter into MODE setting function. Users can set the indoor unit to the Force Cool mode or OFF mode.
- 8) **OK:** Pressing OK button to confirm all settings and send the setting signals to the corresponding air-conditioners.
- 9) **LOCK:** Press this button to disable other buttons and prevent users from pressing the other button neglectfully. Press this button again to quit the lock status.
- 10) **ADDRESS:** In set page, pressing the SET button repeatedly, the address number will be increased by one. When the address is equal 31 and you press once more, the address will restart from 16.


Description of LCD Screen



Data Delivering



1. Figure  means CCM is sending query order;

2. Figure  means CCM is in communication connection with PC, and it will be off in 20 seconds with no communication;










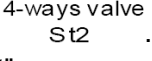
3. Figure  means CCM is in communication connection with outdoor unit, and it will be off in 20 seconds with no communication

4 Press the OK button in setting page and waiting for 4 seconds, "successful" or "unsuccessful" will be shown in the operation state area.

Stand-by Page Display:

1. Figure  #Module Online ON means the total number of online modules;
2. Figure  #Outdoor unit Online ON means the total number of online outdoor units;
3. Stand-by Page can display the address of CCM with the address format of "Addr xx" here "xx" equals the real address of CCM plus 16 so the range of "xx" is 16-31.

Query Page Display:

1. Query Page Display the symbol of query.
2. Displaying the selected outdoor unit with address of  #Module and  #Outdoor unit.
3. Mode display:  means cool,  means heat, OFF means shut off,  means cooling mode only,  means heating mode only.
4. Fan Speed Display:  means low speed,  means middle speed,  means high speed.
5. Compressor State Display "COMP. 1 2 3 4".
6. Electromagnetism Valve Display "EMV. 1 2 3 4 5 6".
7. 4-Ways Valve Display:  4-ways valve St2.
8. Defrost Display "Defrost".
9. Oil Return Display "OIL RETURN".
10. Page 0 displays the consumption of electric energy with: "ELECTRIC ENERGY kW/h" and the number.
11. Page1 displays the input power frequency with Frequency Hz and the number.
12. Page2 displays the total number of indoor units.
13. Page3 displays the temperature symbolic T3 "TEMP. °C", "T3" and the number.
14. Page4 displays the temperature symbolic T4 "TEMP. °C", "T4" and the number.
15. Page5 displays the temperature symbolic T6 "TEMP. °C", "T6" and the number.
16. Page6 displays the discharge temperature of compressor symbolic C1 with "TEMP. °C", "C1" and the number.
17. Page7 displays the discharge temperature of compressor symbolic C2 with "TEMP. °C", "C2" and the number.
18. Page8 displays the discharge temperature of compressor symbolic C3 with "TEMP. °C", "C3" and the number.
19. Page9 displays the compressor current symbolic 1 with "CURRENTA", "1" and the number.
20. Page10 displays the compressor current symbolic 2 with "CURRENT A", "2" and the number.
21. Page11 displays the compressor current symbolic 3 with "CURRENTA", "3" and the number.
22. Page12 displays the digital capacity with "DIGITAL CAPACITY" and the number.
23. Page13 displays the openness of electromagnetism valve symbolic 1 with "VALVE OPENNESS", "1" and the number.
24. Page14 displays the openness of electromagnetism valve symbolic 2 with "VALVE OPENNESS", "2"

and the number.

25. Page15 displays the most advanced malfunction with "MALFUNCTION" and the code.

26. Page16 displays the most advanced protection with "PROTECTION" and the code.

NOTE:

The page will increase or decrease by 1 every time you press "PAGE Up" or "PAGE DOWN"

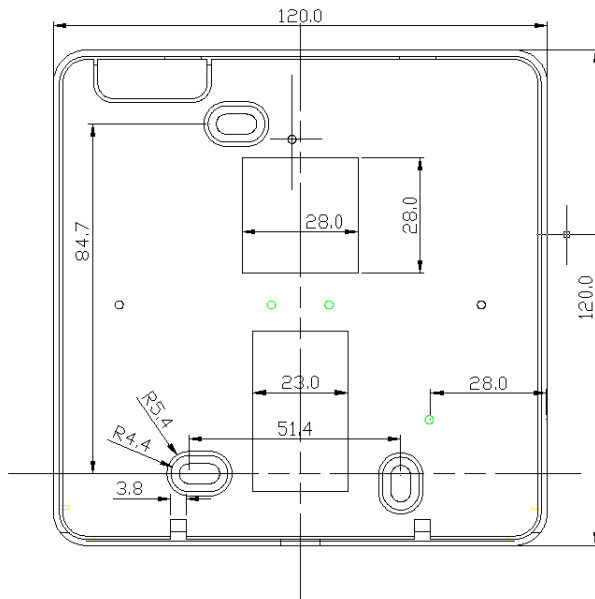
Select the online outdoor unit by push the "previous" or "next" freely.

Set Page Display:

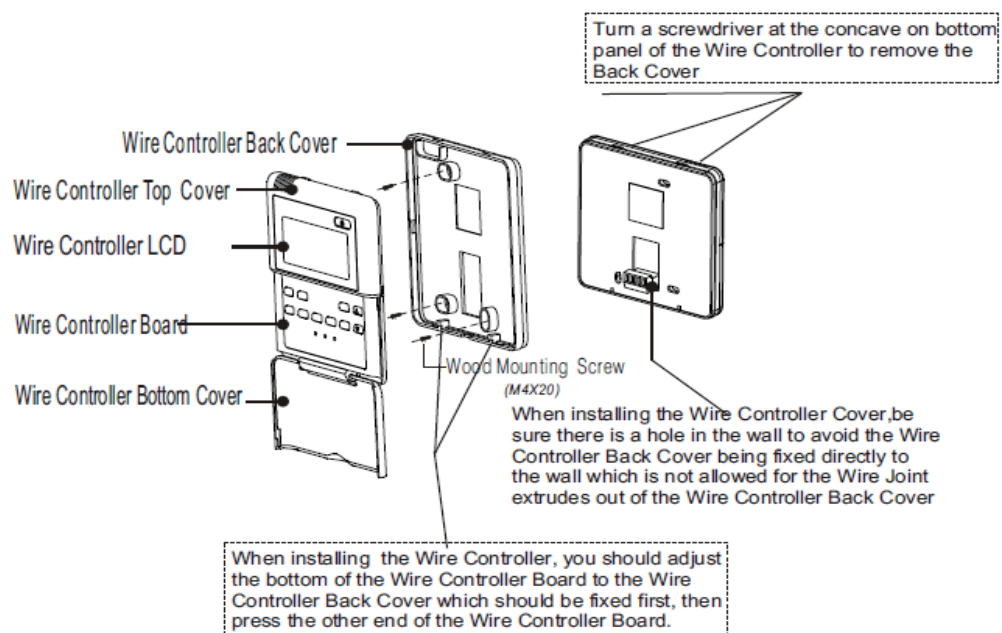
1. Set Page Displays "set";
2. Mode display: Pressing MODE button, and select Forced Cooling or OFF mode;
3. Set page displays the addresses of selected outdoor unit and module;
4. Pressing OK button to confirm all settings and send the signals to the corresponding air conditioners.
5. "successful" or "unsuccessful" will be displayed in the display panel to show whether the signals are accepted or not.

2.4.3.3 Installation of MD-CCM02

Dimensions: 120*120*15mm



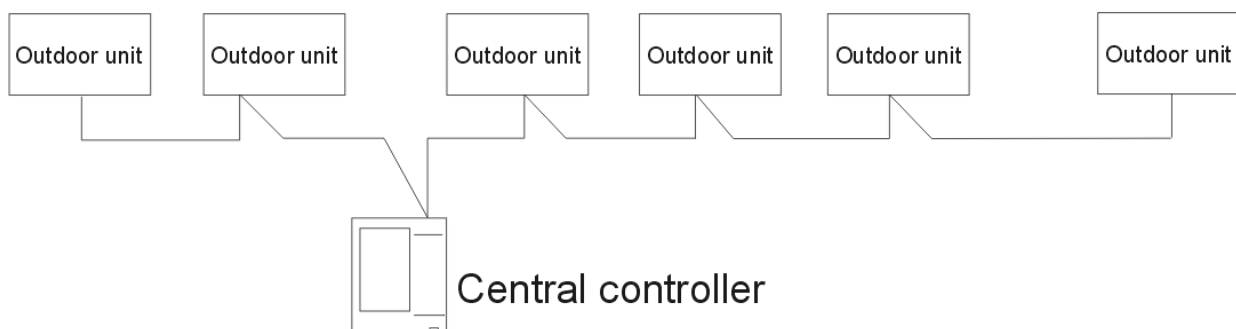
Structure and Composition

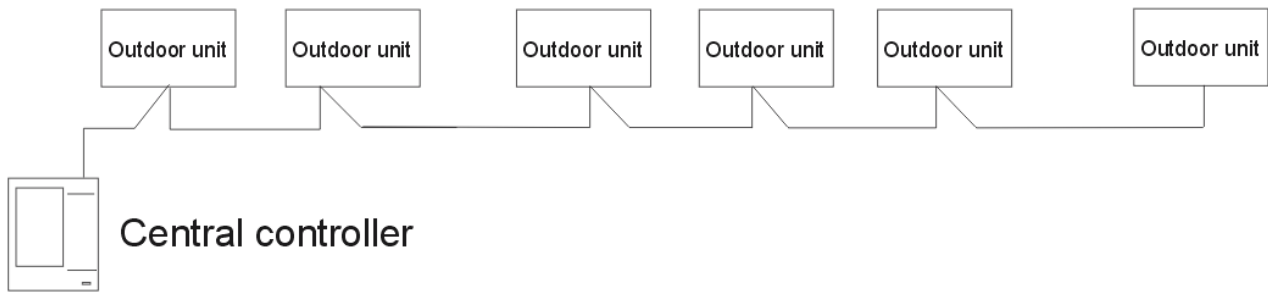


Wiring sketch map of MD-CCM02 and outdoor units

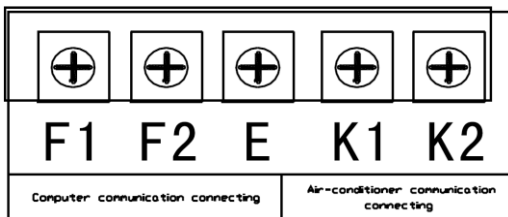
These 2 ways are both available

1st way:

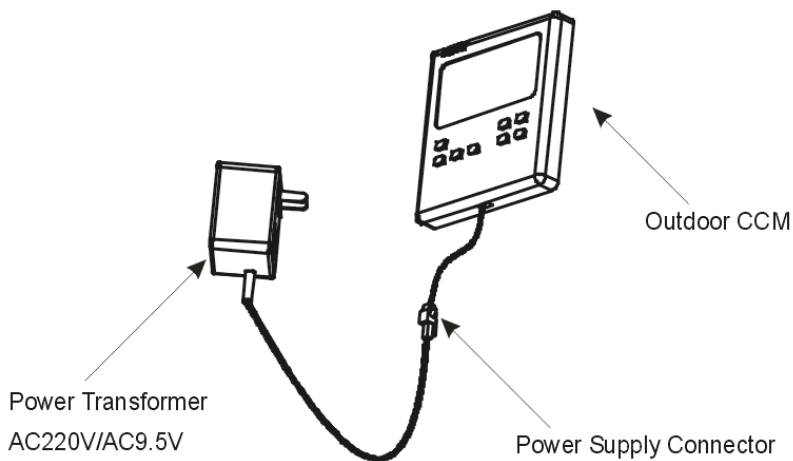


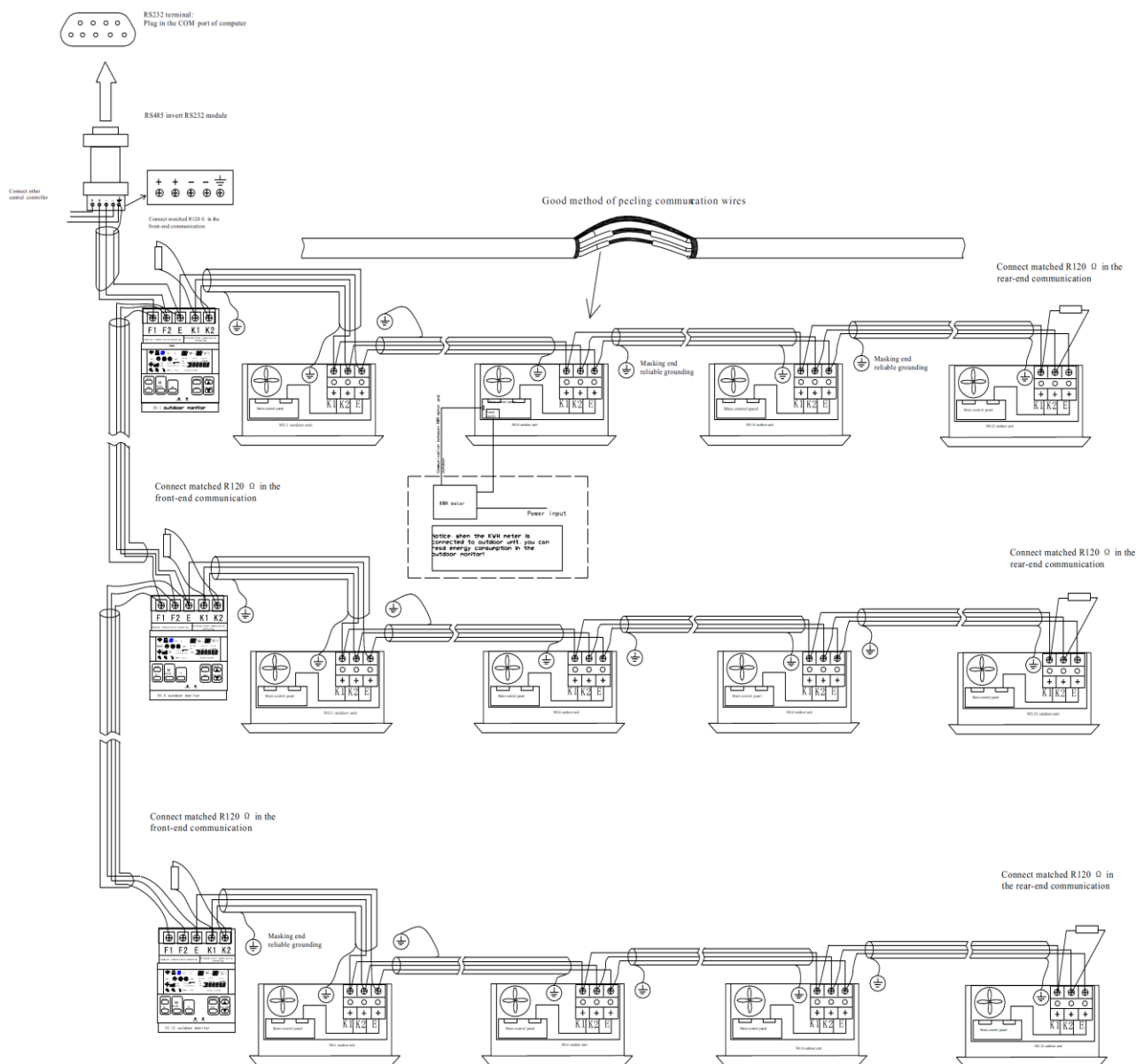
2nd way:

The MD-CCM02 wiring ports are as follows. F1, F2, E joints are used for PC connection. K1, K2, E joints are used for outdoor unit connections. E joint is the common terminal.

**Power supply**

MD-CCM02 uses a power adaptor to obtain power supply from the normal AC220V. Remember to connect the adaptor's connector.

**Wiring Sketch Map of Building Network Air-conditioning System**



Notice

- (1) One computer can connect 16 outdoor central monitor
- (2) One outdoor central monitor can connect 32 outdoor units
- (3) You need connect resistors 120 Ω in the start and end of each “K1, K2, E” net.
- (4) Communication wire masking end assure reliable grounding

Remarks

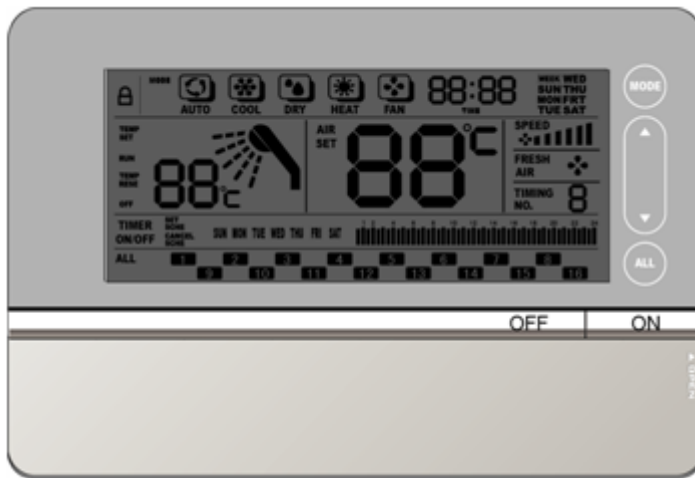
- (1) In the wiring, the part from Rs485 to Rs232 is only needed when connecting with PC. And one PC can connect maximum 16 outdoor MD-CCM02 and 16 indoor MD-CCM03. The addresses of MD-CCM03 ranges from 0 to 15, while the MD-CCM02 ones from 16 to 31.
- (2) One outdoor centralized monitoring MD-CCM02 can connect maximum 32 outdoor units, while one indoor MD-CCM03/E can connect maximum 64 indoor units.
- (3) The address of outdoor CCM and the address of outdoor units are set by manual. Please refer to their owner's manual for setting.

2.4.4.4 Query and error codes

Press QUERY button to start the query function. Then press the PREVOIS and NEXT buttons to select the outdoor unit that we want to check. Press the PAGE UP button 15 times to display the corresponding outdoor unit's error code or 16 times to display the protection code.

2.4.5 Wire controller **KJRF-180A/MBT-E and KJRF-180A1/MBT-E**

The only difference between KJRF-180A/MBT-E and KJRF-180A1/MBT-E is their cabinet's shape. Their controlling functions are totally the same.



- Newly designed centralized controller with graceful appearance.
- Able to centralized control up to 16 indoor units, which group can contain 1 fresh air indoor unit.
- Able to control the heat pump water heater.

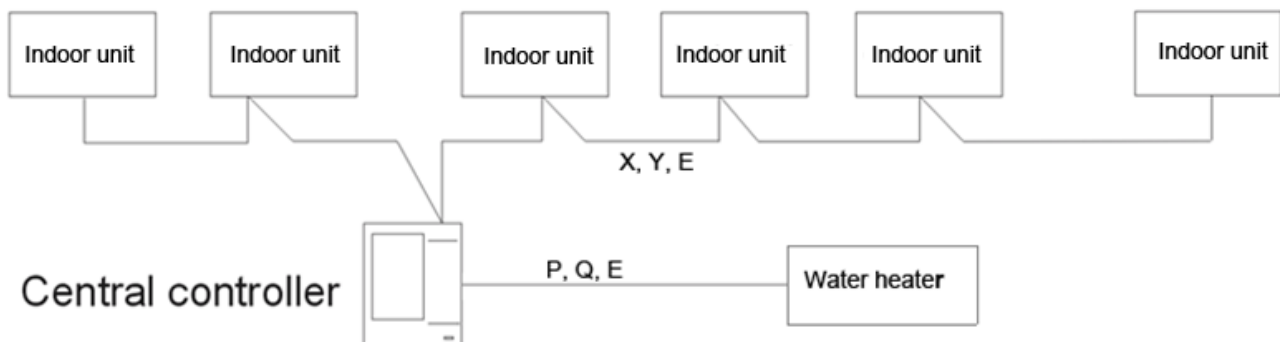
2.4.5.1 System configure

With KJRF-180A/MBT-E, we are able to centrally control up to 16 indoor air conditioner units and 1 heat pump water heater. When the centralized control function works, it acts like the MD-CCM09.

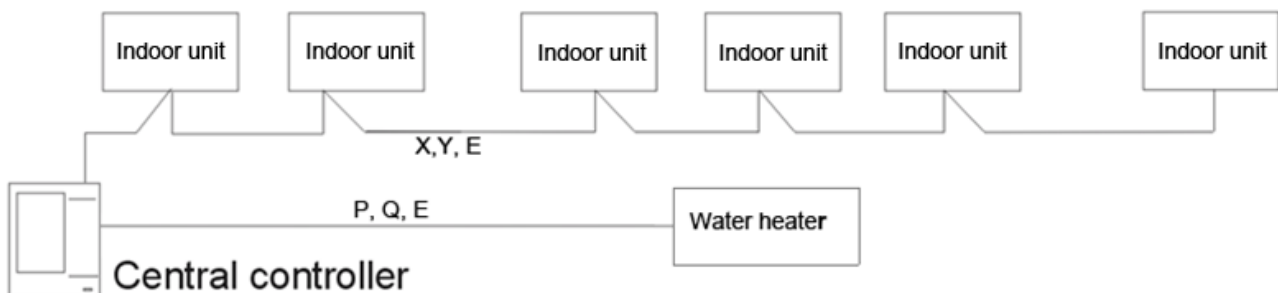
KJRF-180A/MBT-E and KJRF-180A1/MBT-E are unable to connect the indoor units to the PC or BMS.

These 2 ways for the centralized controller to connect the indoors units are both available

1st way:



2nd way:



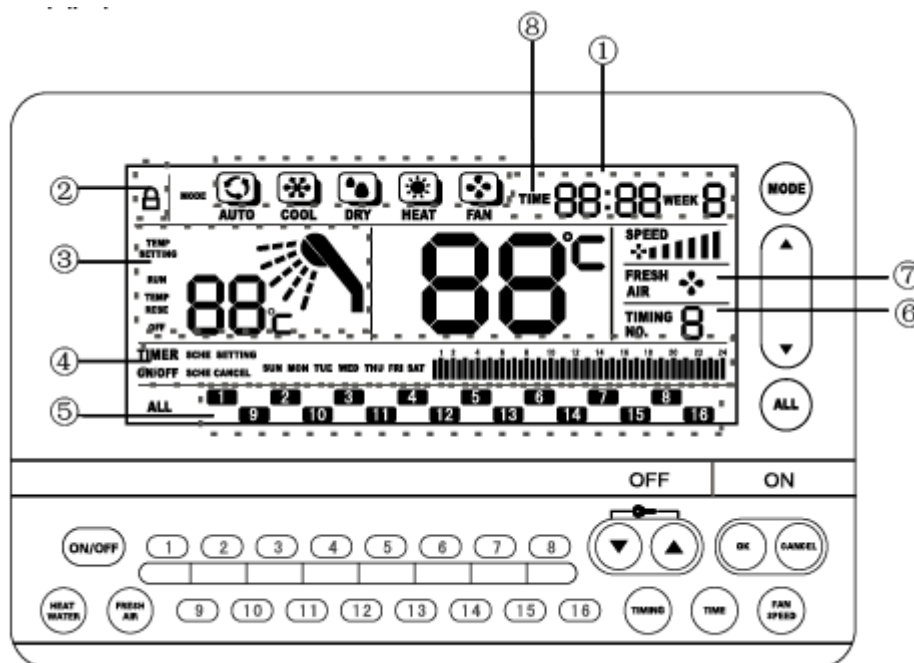
To establish a steady network the following should be noted

- The signal wire should be 3-core shielded wire and the wire should be provided by licensed electricians.

- To make signal transmission steady and to protect the facilities, the signal transmission wires should not be near to the power line. An interval of 300mm-500mm should exist between these two kinds of wires.
- The signal wire of each network should be less than 1,200m.
- The unit and the centralized controller should be connected hand-in-hand, which means that all the units' same port should be connected to a 3-core wire and the signal wire should be linear in topology. Or else, the facilities could not work normally.

2.4.5.2 Description Name and Functions

Liquid Crystal Display:



①The current time and date display

Display the date and the time.

②Operation lock display

Display whether the item is locked or not.

③Displays water heater area

Display the working status of the water heater.

④Displays event content settings

Display the content of the schedule.

⑤Displays operating status of the air-conditioner

Display whether the air-conditioner is running: LCD will be illuminated when the corresponding unit is running, or flash slowly if it is not.

⑥Timing sequence

Display the timing sequence when setting the events.

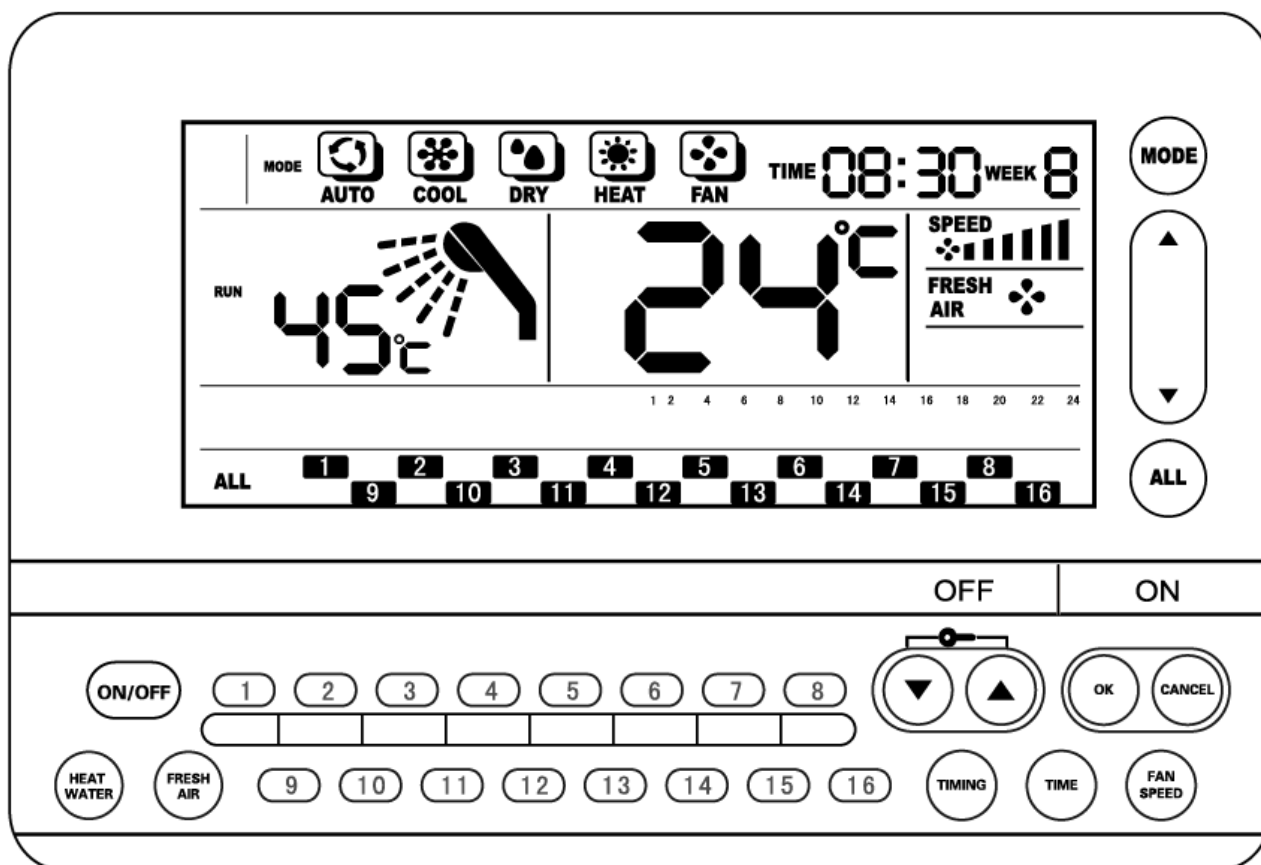
⑦Display the state of the fresh air

Display the current work state of the fresh air handling unit.

⑧Display the set temperature of the air-conditioner

Display the current setting temperature of the corresponding air-conditioner.

Keys and functions

**Mode button:**

Press this button to change the indoor unit's running mode. The changing sequence of the mode is as follows, Auto/ Cool/Dry/Heat/Fan.

Temperature setting button:

Press this button to adjust the setting temperature

ALL button:

Press this button to select all the indoor units.

ON/OFF button:

This button is used for turning on or turning off the water heater of the fresh air unit. The operation takes effect after pressing the OK button.

OFF button:

Turn off all or one single air-conditioner.

ON button:

Turn on all or one single air-conditioner.

FRESH AIR button:

Press this key to select the fresh air unit. And then we can change the setting of the fresh air unit.

TIME setting button:

Press this key to activate the time setting function.

OK button:

Press this button to confirm all the settings and deliver the signal the commands to the indoor units.

Water heater button:

Press this key to select the water heater. And then we can change the setting of the fresh air unit.

TIMING button:

Press this button to start setting the turning on and turning off schedule of the indoor unit.

UP and DOWN button:

Used for adjusting the setting temperature the air conditioner and the water heater. Users can lock or unlock the keyboard by pressing the 2 keys synchronously.

CANCEL button:

Cancel the setting operation.

A single air-conditioner selection button:

Use this button to select the corresponding air conditioner.

FAN SPEED button:

Press this button to change the fan's running speed.

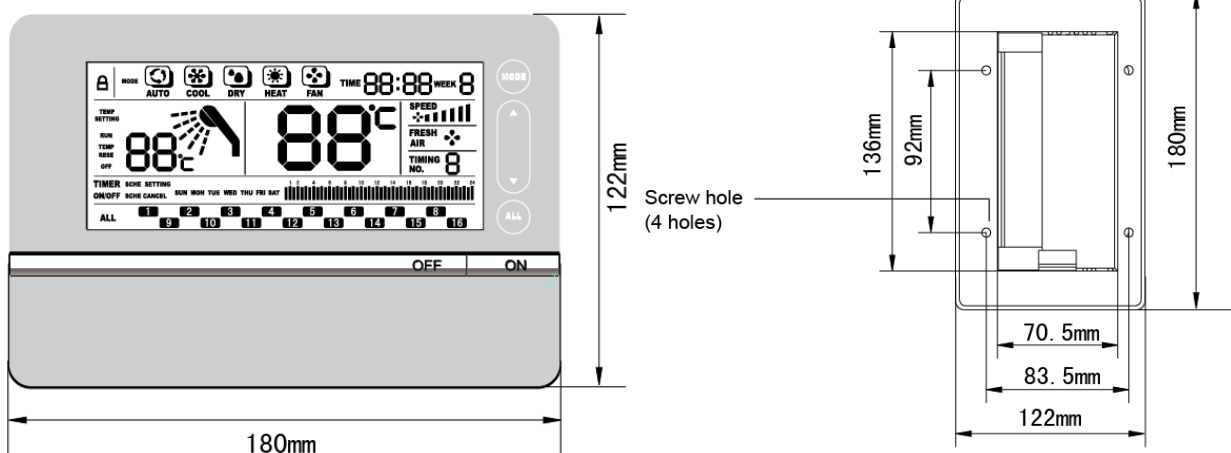
2.4.5.3 Installation

Dimension:

KJRF-180A/MBT-E: 180*122*69mm

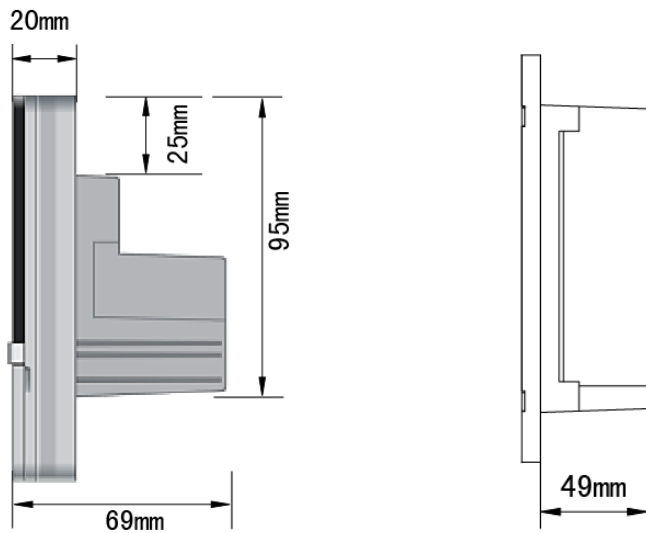
KJRF-180A1/MBT-E: 180*122*69mm

Upper Shell

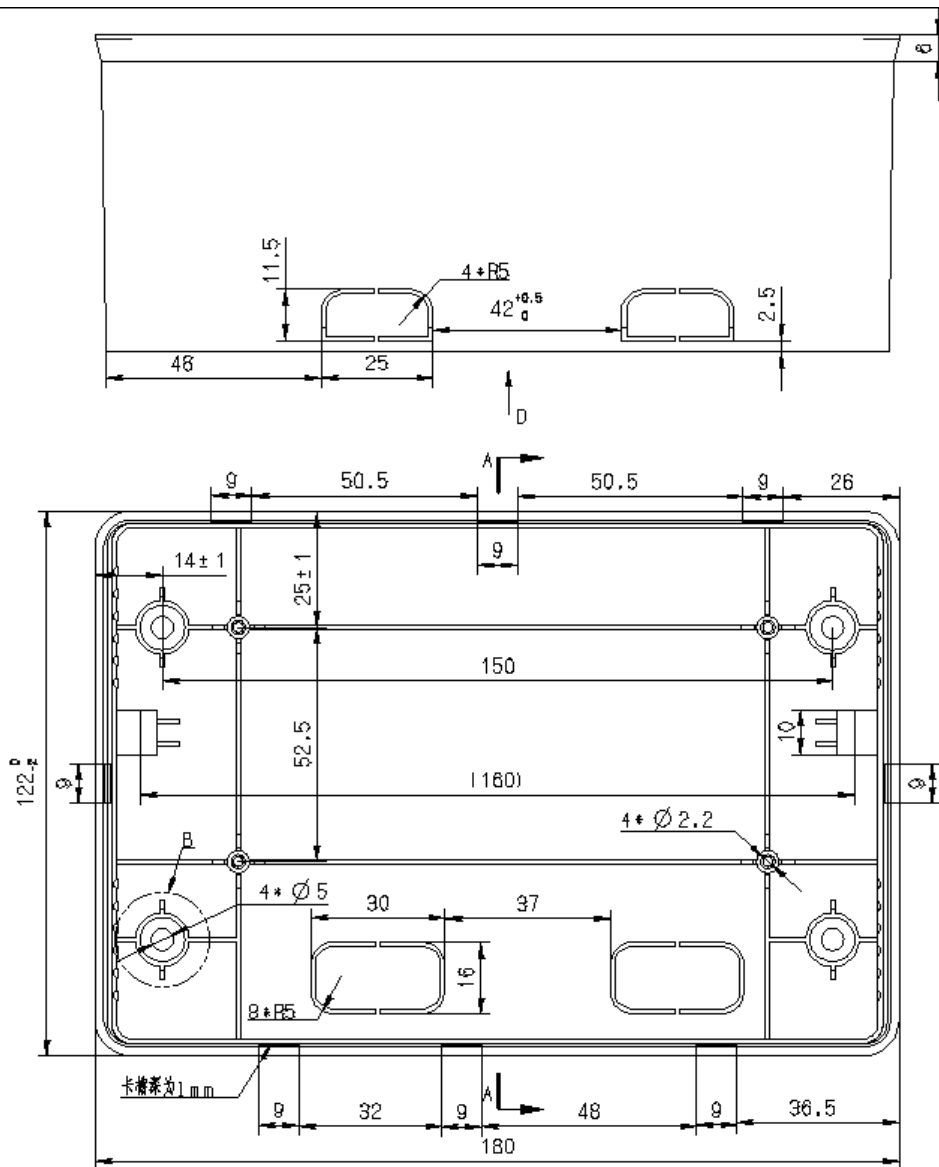


Base cabinet:

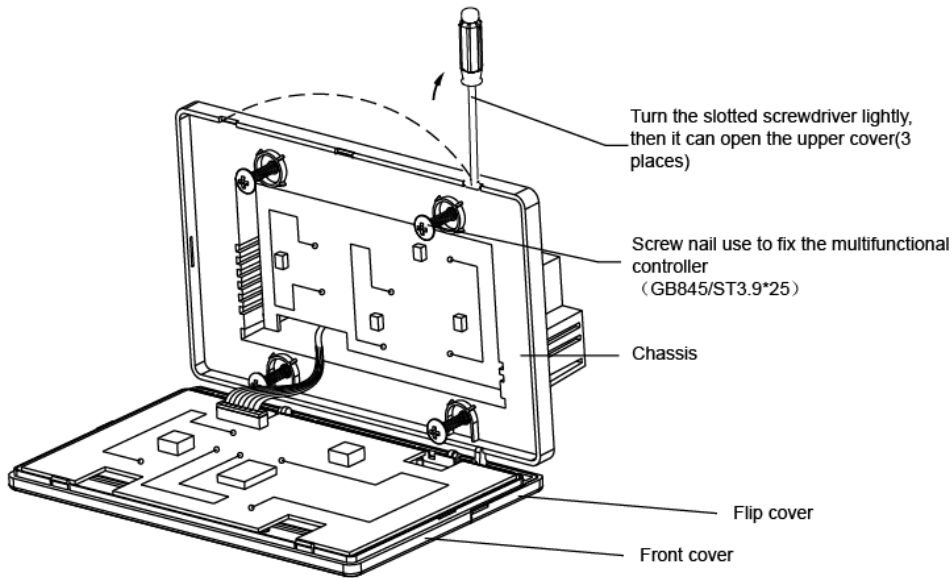
1) KJRF-180A/MBT



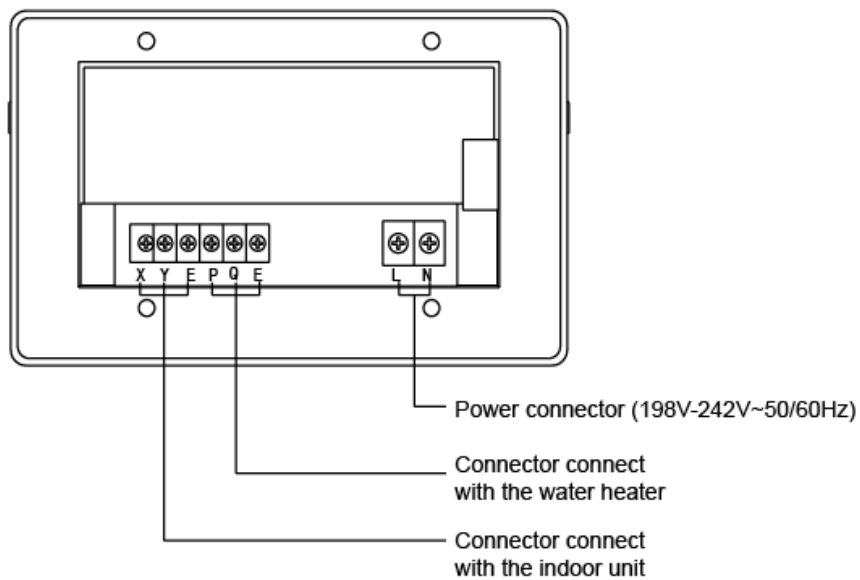
KJRF-180A1/MBT



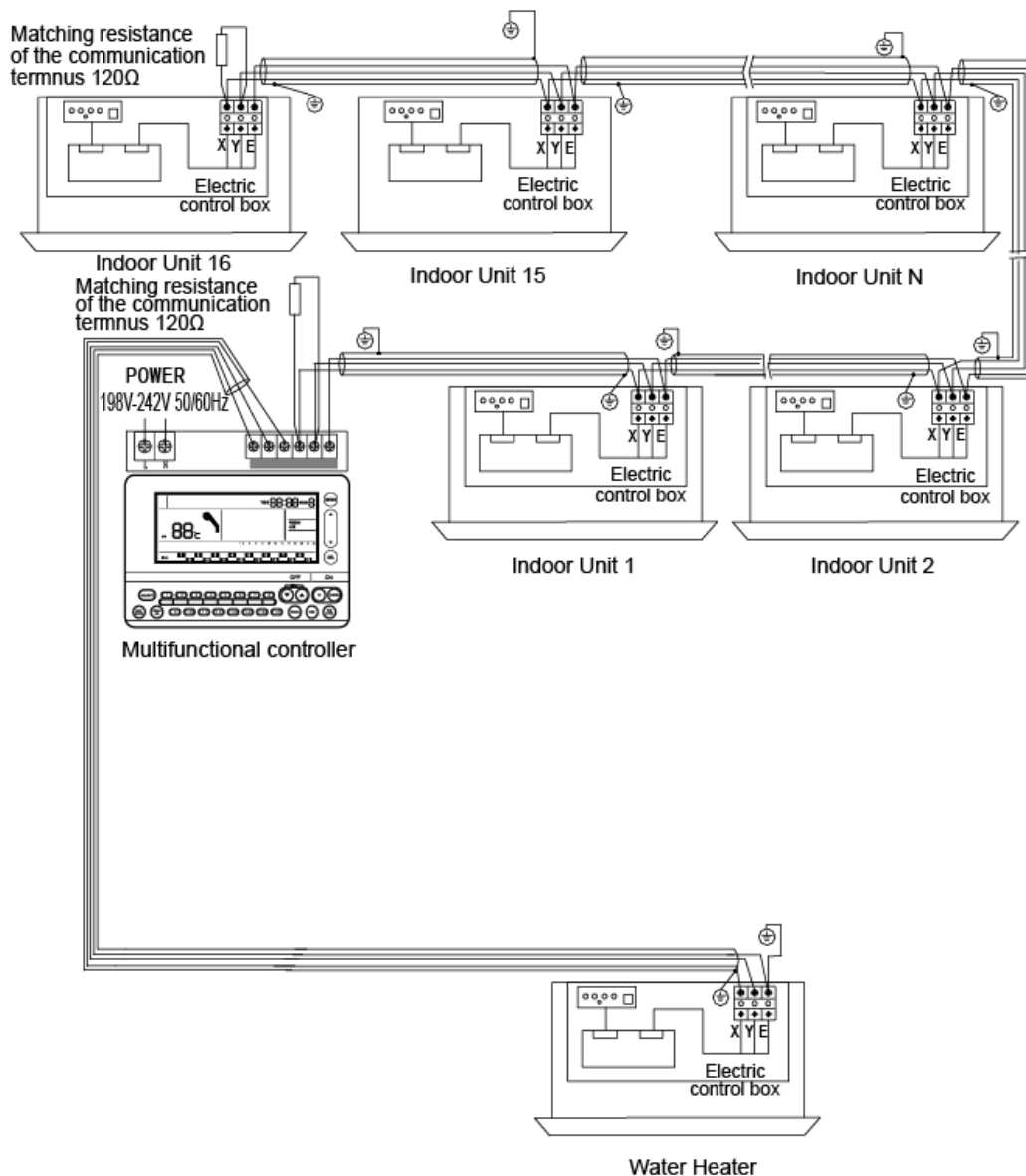
Detaching the shell



Wiring at the back



Available wiring diagram




2.4.5.4 Error and Diagnosis

1. If the centralized controller can not detect the indoor units, and does not display the icons

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 . Check the wiring from the malfunction indoor unit to the

controller. Please make sure that the joint are tied steadily and the wiring obeys the hand-in-hand rule.

2. if the centralized controller can not detect the water heater and does not display the shower icon , then check whether the P, Q, E of the controller is connected to the communicative line X, Y, E of the water heater correctly. If it weren't connected to the water heater directly, it would not display the shower icon.

Note: KJRF-180A/MBT-E or KJRF-180A1/MBT-E does not display the error code of the indoor unit.

2.4.6 Mode Lock Controller **KJR-31B/E**

KJR-31B/E is a wired centralized mode lock controller. With this device, we could lock the mode of all the units connected to this controller to avoid mode conflict. When the mode conflict happens, e.g. some indoor units request cooling and some heating, the outdoor unit could only work in either mode. As a result, some of the indoor units could not work. By adopting this device, we could consider the environment and artificially determine whether the indoor units should work at cooling or heating mode.

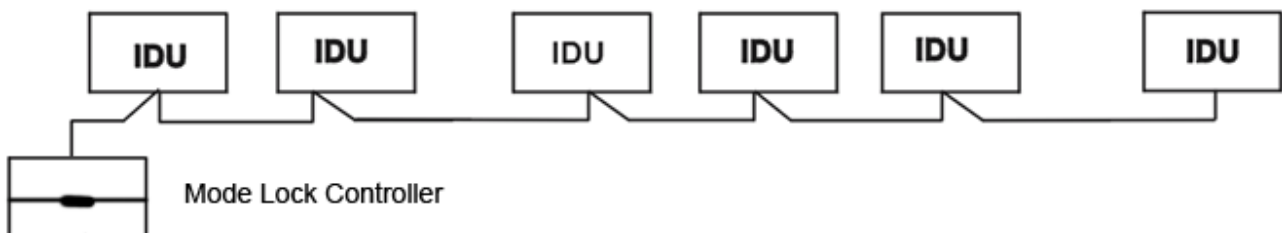


- **New designed and graceful appearance**
- **Compactly functions and friendly user interface**
- **Easy networking**
- **Connected up to 64 indoor units**

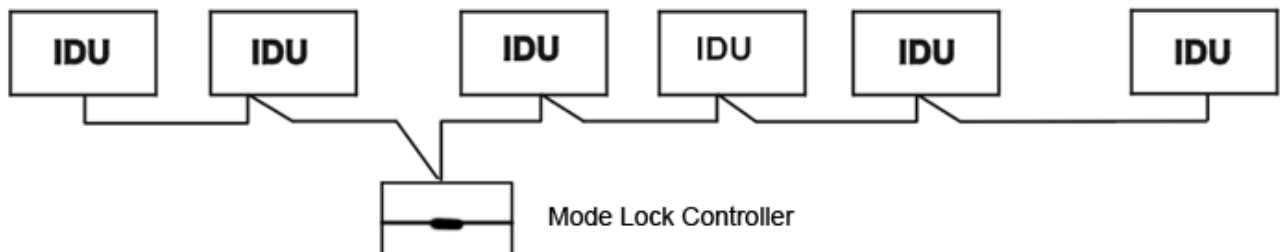
2.4.6.1 System configure

Mode lock controller KJR-31B/E is only a compact indoor unit centralized controller, which cannot bridge the indoor units to the PC or BMS. Its network configuration is much the same as MD-CCM09. The following 2 ways is both available.

1st:



2nd:



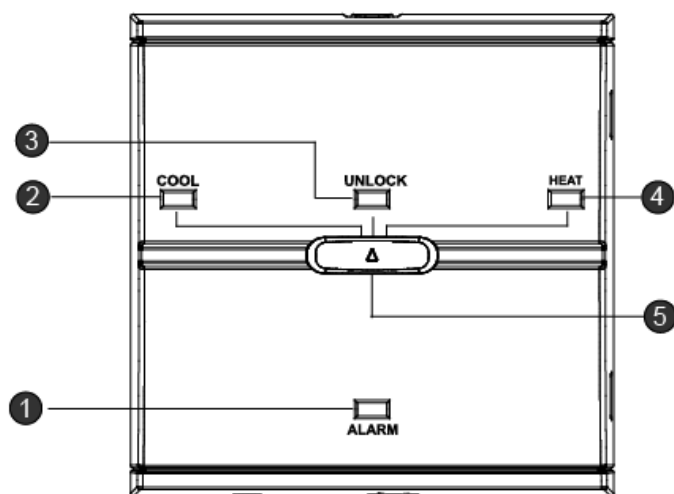
To establish a steady network the following should be noted

- The signal cable and power cable of the central controller cannot be contained in the same cable tube. The distance between the signal cable tube and power cable tube shall be between 300mm -500mm at least.
- The total signal cable length of the central controller shall not exceed 1,200m.

- Make sure there is no joint in the middle of the shielded cable. If such a joint exists, use a socket to connect it.

2.4.6.2 Description Names and Functions

Buttons and indication lights



1 Alarm light

When the alarm lights are on, malfunctions occur on the indoor units. Please check the indoor unit and find the error code on the indoor unit's display panel. After solving the problem, the ALARM light will fade out.

2 COOL light

Push the mode switch leftwards to turn all the indoor units to cooling only mode and the COOL light will be on. This light indicates that all the indoor units are running at cooling mode. Users can only set the cooling parameter such as temperature and fan speed by other controller. If the user changes the units to the heating only mode, the indoor unit displays mode conflict error code. And then the corresponding unit turns off to prevent user's environment from being more unsatisfying.

3 UNLOCK light

Push the mode switch to the middle of the controller and the UNLOCK light will be on. In this mode, all the indoor units are freely to work at heating mode or cooling mode.

4 HEAT light

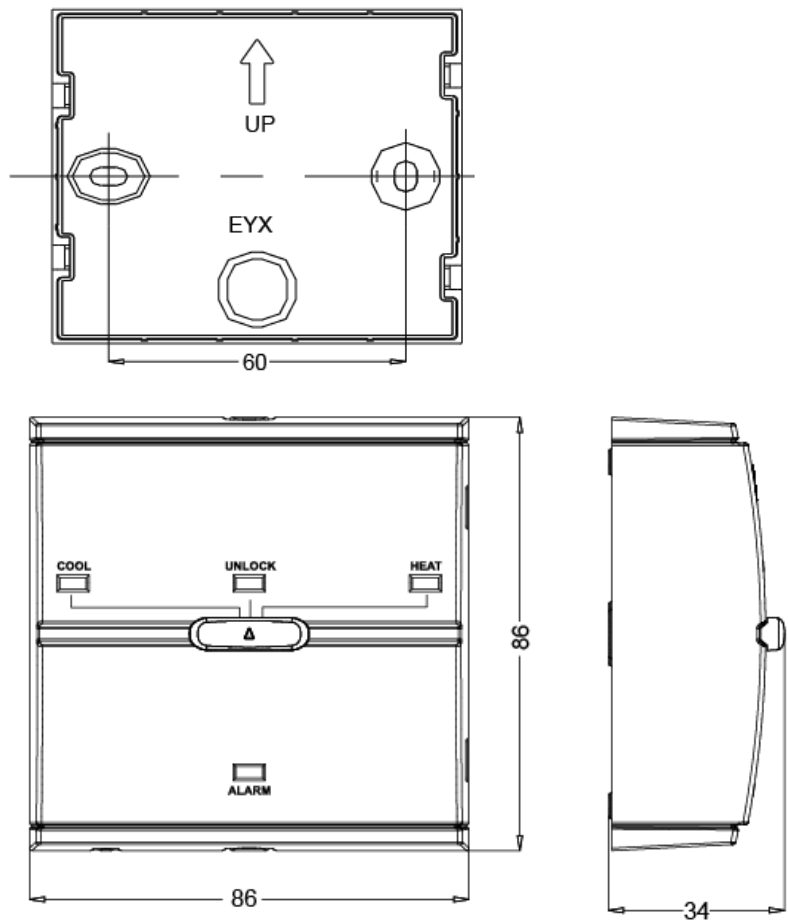
Push the mode switch leftwards to turn all the indoor units to heating only mode and the HEAT light will be on. This light indicates that all the indoor units are running at heating mode. Users can only set the heating parameter such as temperature and fan speed by other controller. If the user changes the units to the cooling only mode, the indoor unit displays mode conflict error code. And then the corresponding unit turns off to prevent user's environment from being more unsatisfying.

5 Mode switch

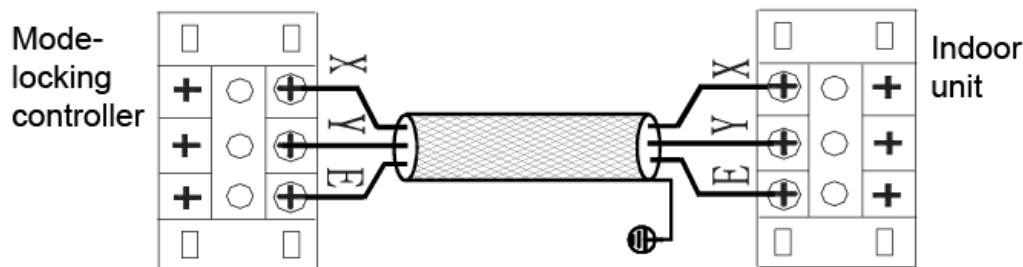
Mode switch is the only key on the controller. Slide this key and command all the indoor units to the corresponding mode to avoid mode conflict.

2.4.6.3 Installation

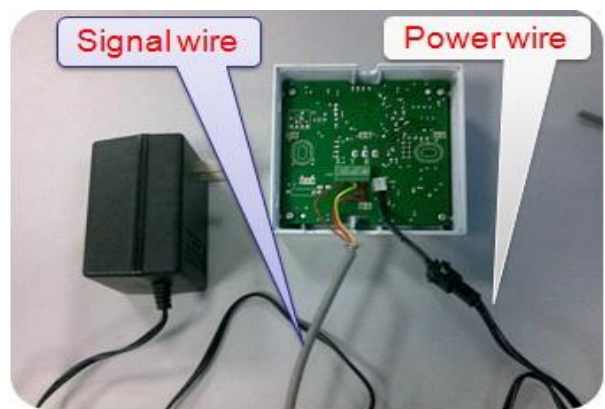
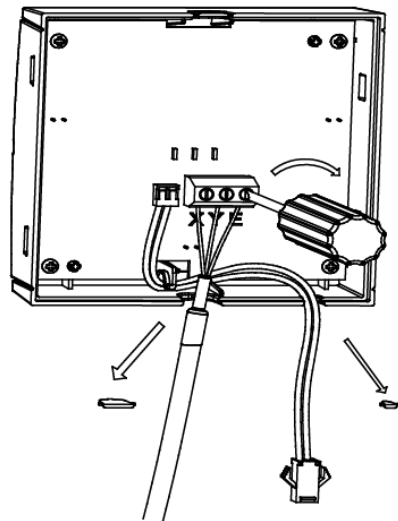
Dimension

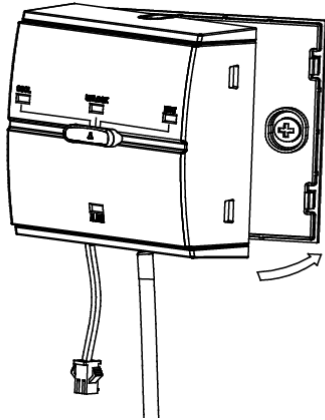
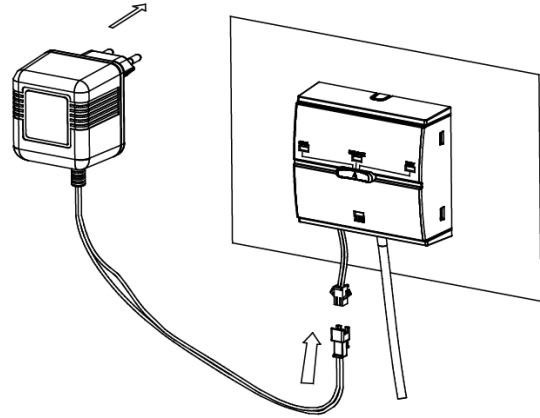


Controlling wiring connection



Tie the screw



Assemble the front shell to the base**Connect the power adaptor to the controller**



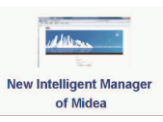
The power supply of the KJR-31B/E should be 220-240V 56/60Hz.

Summary:**Comparison of the centralized controller**

	CCM03	CCM09	KJR-90B	KJR-180A	KJR-31B	CCM02
Time display	—	—	—	●	—	—
Keyboard locking	●	●	—	●	—	●
Querying	●	●	—	●	—	●
Swinging	●	●	—	●	—	—
Error code display	●	●	—	●	—	●
Error code light	—	—	●	—	—	—
Backlight	●	●	—	●	—	—
Schedule	—	●	—	—	—	—
FOLLOW ME	—	—	—	—	—	—
Fan control	●	●	—	●	—	—
Mode selection	●	●	●	●	●	—
Auto-start	●	●	—	●	—	—
Mode lock	●	●	—	—	●	—
Address equipped	●	—	—	—	—	●
Bride to gateway	●	—	—	—	—	●
Max. units	64	64	16	16	64	32

Note: RS-485 is the very communicative way that our units use. In one complete system, several RS-485 networks are built in side. For example, all the P, Q, E terminals compose a RS-485 network, and all the X, Y, E another. So is the K1, K2, E, and the F1, F2, E ones. Each RS-485 network should be connected in the hand-in-hand way. But the different RS-485 networks are separate.

2.5 Network Control System

Controller	Model		Description
Building gateway	MD-CCM08 /E		Building gateway connects to BACnet network for integrating to other BMS to realize air-conditioning management and control. It needn't match Midea network system and PC.
Building gateway	MD-CCM07 /E		Connect VRV to your BMS via LonWorks, Other systems such as those for fire and crime prevention can be easily interlocked with Midea's unit.
Network control software	IMM – Intelligent Manager of Midea		The 3 rd generation network control software with Firebird data. Add network fee charge function and connect the outdoor unit CCM based on the No.2 generation network central control system. It may connect to 16 indoor unit CCM and 1024 indoor units, and also connect to 16 outdoor unit CCM and 128 refrigeration systems.

2.5.1 Building gateway MD-CCM08/E

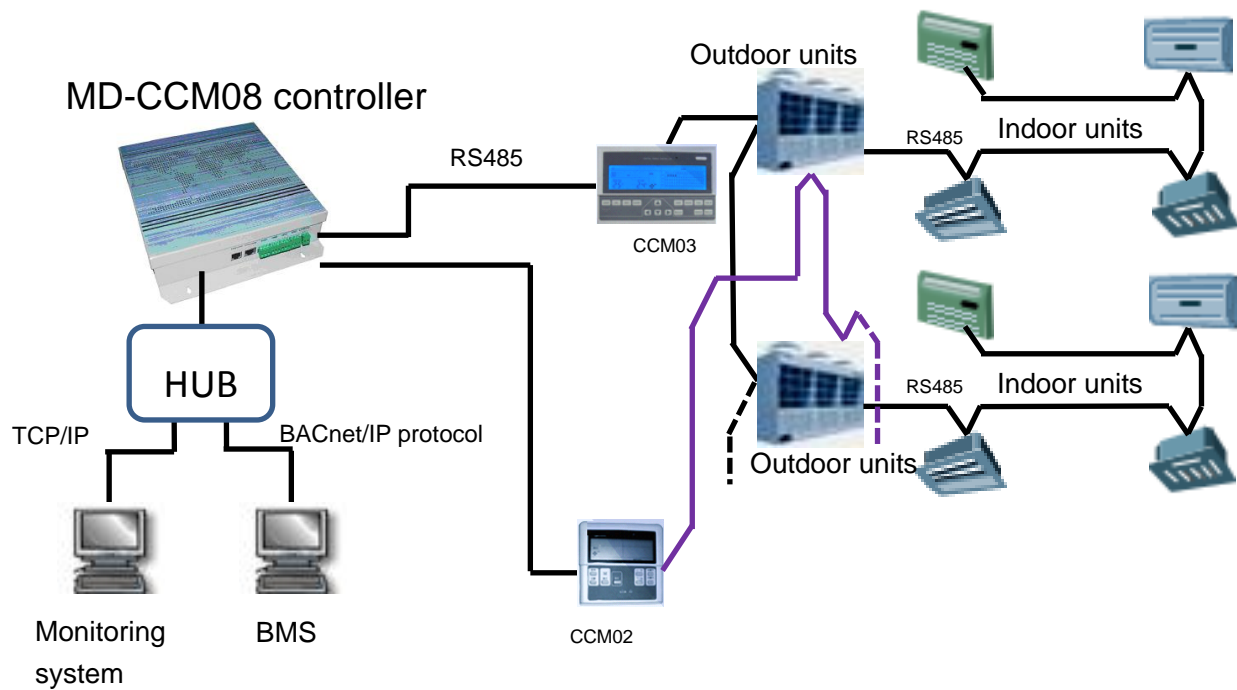
MD-CCM08/E is a gateway to connect the indoor units and outdoor units to the BACnet. BACnet stands for the Building Automation and Control Net work. MD-CCM08/E gathers the information of the IDU and ODU. Besides, MD-CCM08/E is able to send the command to the units.



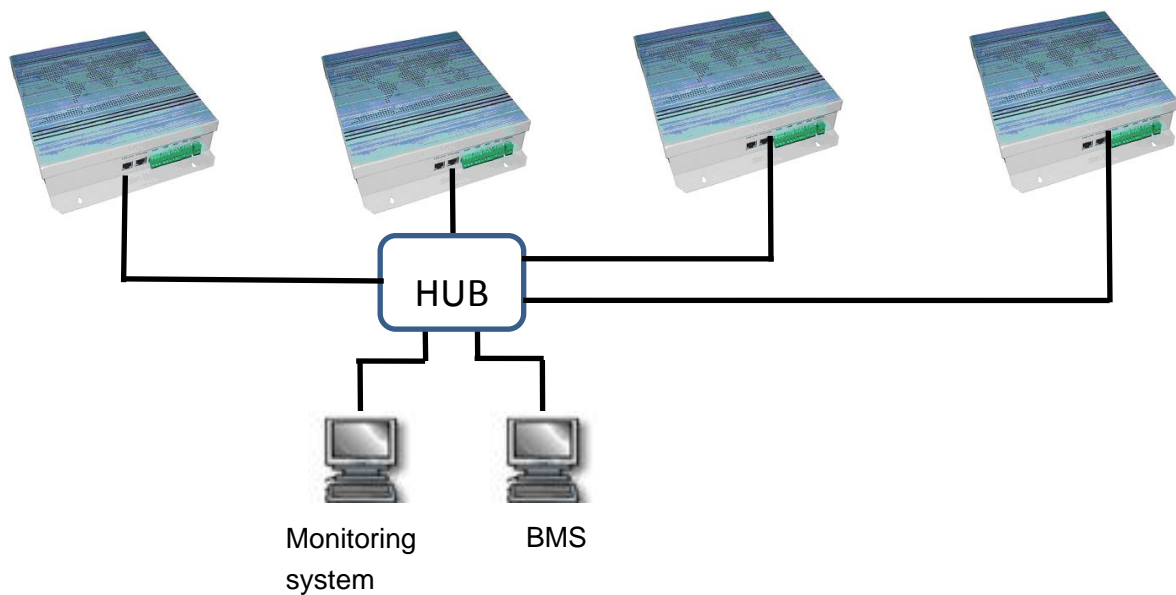
- **Be able to bridge the indoor and outdoor units to the BACnet protocol BMS.**
- **Also be able to connect the indoor and outdoor units only, without the BMS.**
- **Contains 4 Groups of RS485 communication ports and able to connect up to 256 indoor units or 128 outdoor units instead.**
- **User can check the units' status and change their settings via local network.**
- **Compatible with Firebird.**

2.5.1.1 System configure

MD-CCM08 is able to connect up to 4 groups of RS-485 communicative network. Each of the RS-485 networks contains up to 64 indoor units or up to 32 outdoor units. The input of MD-CCM08/E should be directly connected to the CCM02 or CCM03.

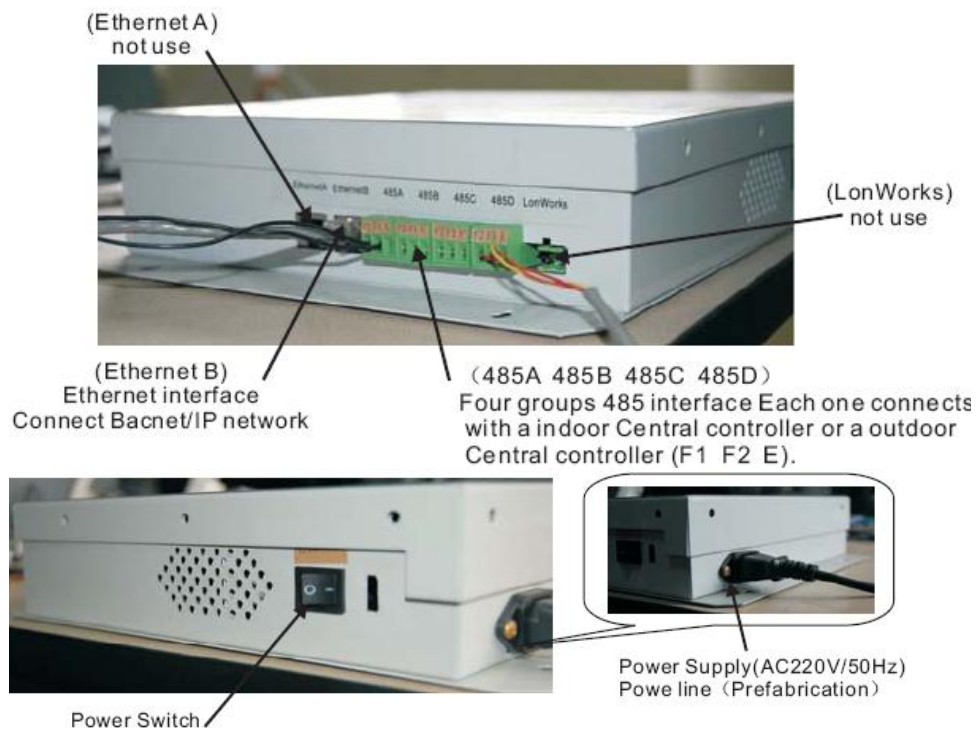


If there are a few MD-CCM08 applied in the system, the MD-CCM08 can be connected to the HUB and then connected to the monitoring system and BMS.



Note: MD-CCM08 and the BMS computer must be at the same subnet address field. Or else, the device cannot work normally. The default address of CCM08 is set to be under the segment "192.168.*.*".

2.5.1.2 Connecting ports and functions



MD-CCM08 has some kinds of connecting ports. EthernetA and LonWorks ports are used for further function designed and do not function by now.

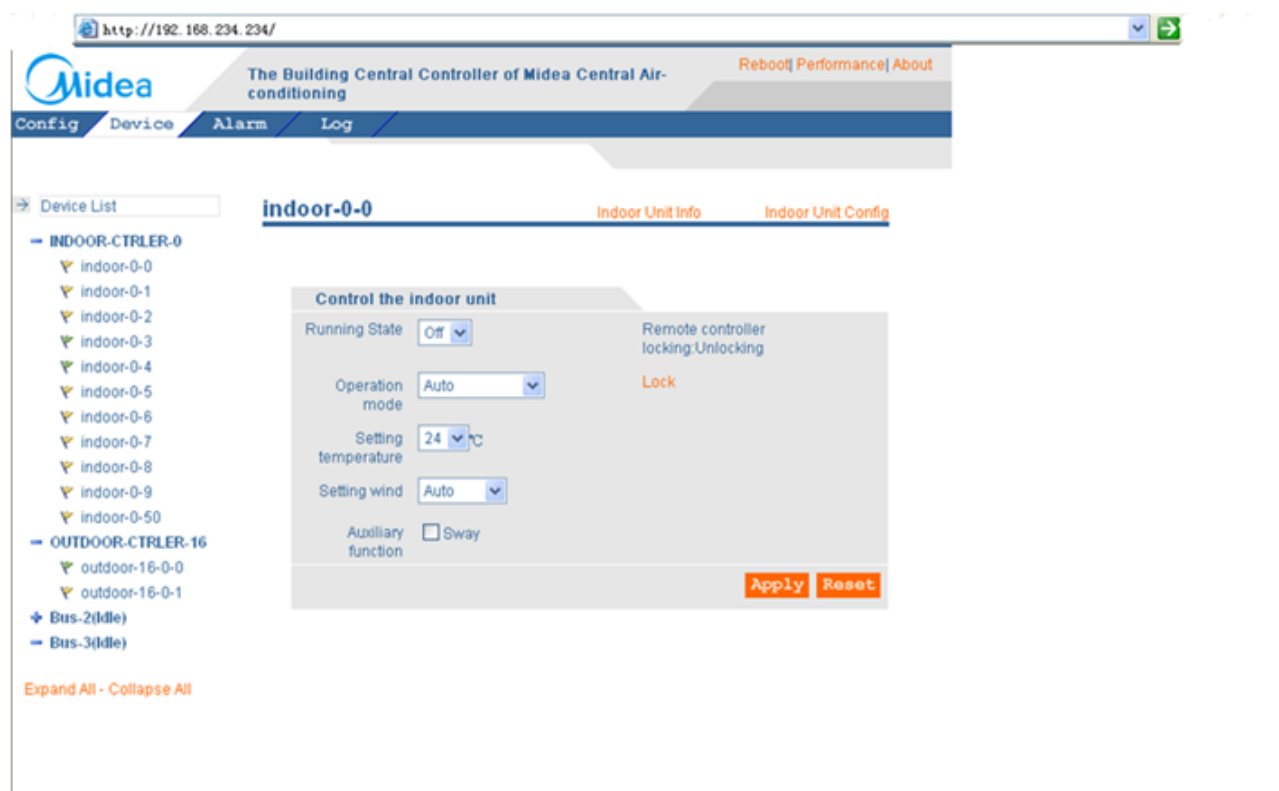
Ethernet B port is an Ethernet interface base on the BACnet network protocol. Connect this port with the BACnet HUB, then the device connect to the HUB can communicate with the MD-CCM08.

485A-485D: 4 groups of RS-485 communicative port. Each port can be connected to a MD-CCM02 or MD-CCM08 via the "F1, F2, E" terminals.

2.5.1.3 WEB access

MD-CCM08 can offer web service, which allows users access the gateway from the local computer network. Type the address of MD-CCM08 in the explorer's address field and users can view then MD-CCM08's connecting status or change the working status of the indoor units. The interfaces are as follows:










Note: The address “192.168.234.234” is not constant in every CCM08. Users can find the default address in the package. Please modify the address of MD-CCM08 and make sure that the address is in the same subnet with the BMS computer before used.

Moreover, the default administrator account to login the MD-CCM08 is “Admin”, default password “123456”.

To save the air conditioner’s running data, an SD card is needed but not included in this product. Users can purchase one from the market. SD cards of different volume can save different periods of running data. Normally an SD card of 1 GB is able to save the data of more than 1 year.

2.5.1.4 Available BMS

MD-CCM08 has a wonderful adaptability to the BMS. It can be connected to many company’s building management system software. We can get the mainly supporting BMS information from the table below:

	Company	BMS software	Brand
1	SIMENS	APOGEE	
2	TRANE	Tracer Summit	
3	Honeywell	Alerton	
4	Schneider	Andover	
5	Johnson	METASYS	

2.5.2 Building gateway MD-CCM07/E

MD-CCM07/E is a gateway to connect the indoor units and outdoor units to the LonWorks network. MD-CCM07/E helps other LonWorks devices gathering the information from the Midea central A/C, and help setting the indoor units' working mode. Compared with the MD-CCM07/E, MD-CCM08 needs a computer and the 3rd generation monitoring software.



Connect Central A/C system to LonWorks network.

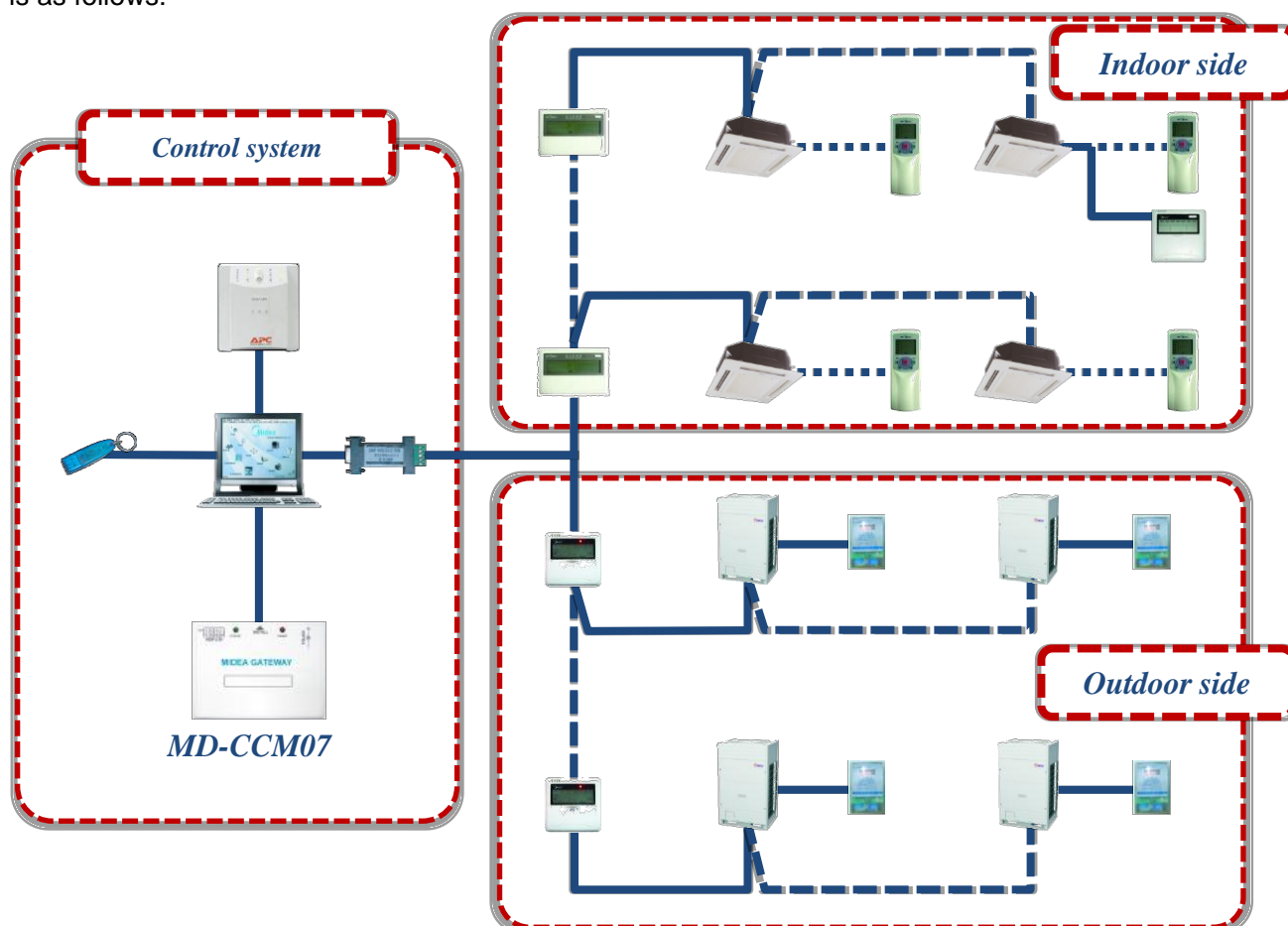
The core control module applies flash memory.

Easily download the program on line.

CCM07 applies nonpolar twisted pair lines, which makes connecting to LonWorks network easily.

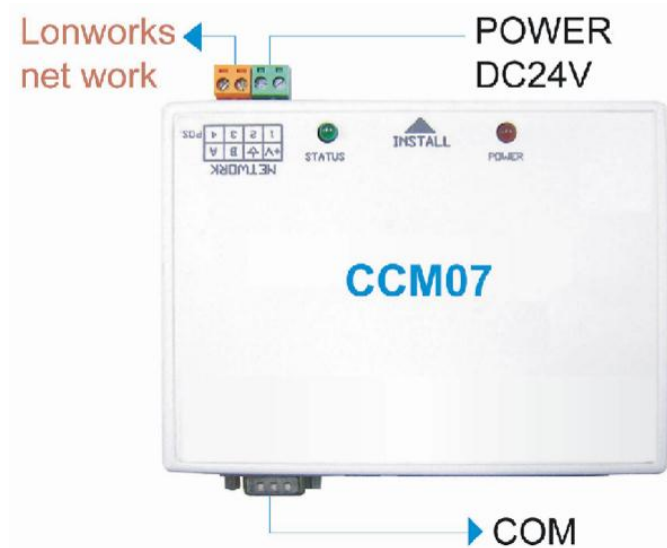
2.5.2.1 System configure

MD-CCM07 is a gateway from the 3rd network control software to the LonWorks, which can gather all the units' information and control the indoor units. As a result, the indoor and outdoor units need firstly connecting to the computer to make a central monitoring system. The composition of the whole network is as follows:



If there are a few MD-CCM07 devices to compose a LonWorks network, the LonWorks terminals of the MD-CCM07 are able to be connected in the hand-in-hand way.

2.5.2.2 Connecting ports and functions



COM port: This port should be connected to the computer's COM port, using the RS-232 communicative standard.

LonWorks: This port uses a removable connecting way to help user connect the LonWorks network conveniently.

DC POWER: MD-CCM07 is an active gateway, so MD-CCM07 inquires a power supply of DC 24V. This port should be connected to the DC power adaptor.

2.5.2 Network control software MDV-WLJKXT/E(V3.1)(Firebird)

Please refer to "installation and operation manual" of "3rd generation network control software".

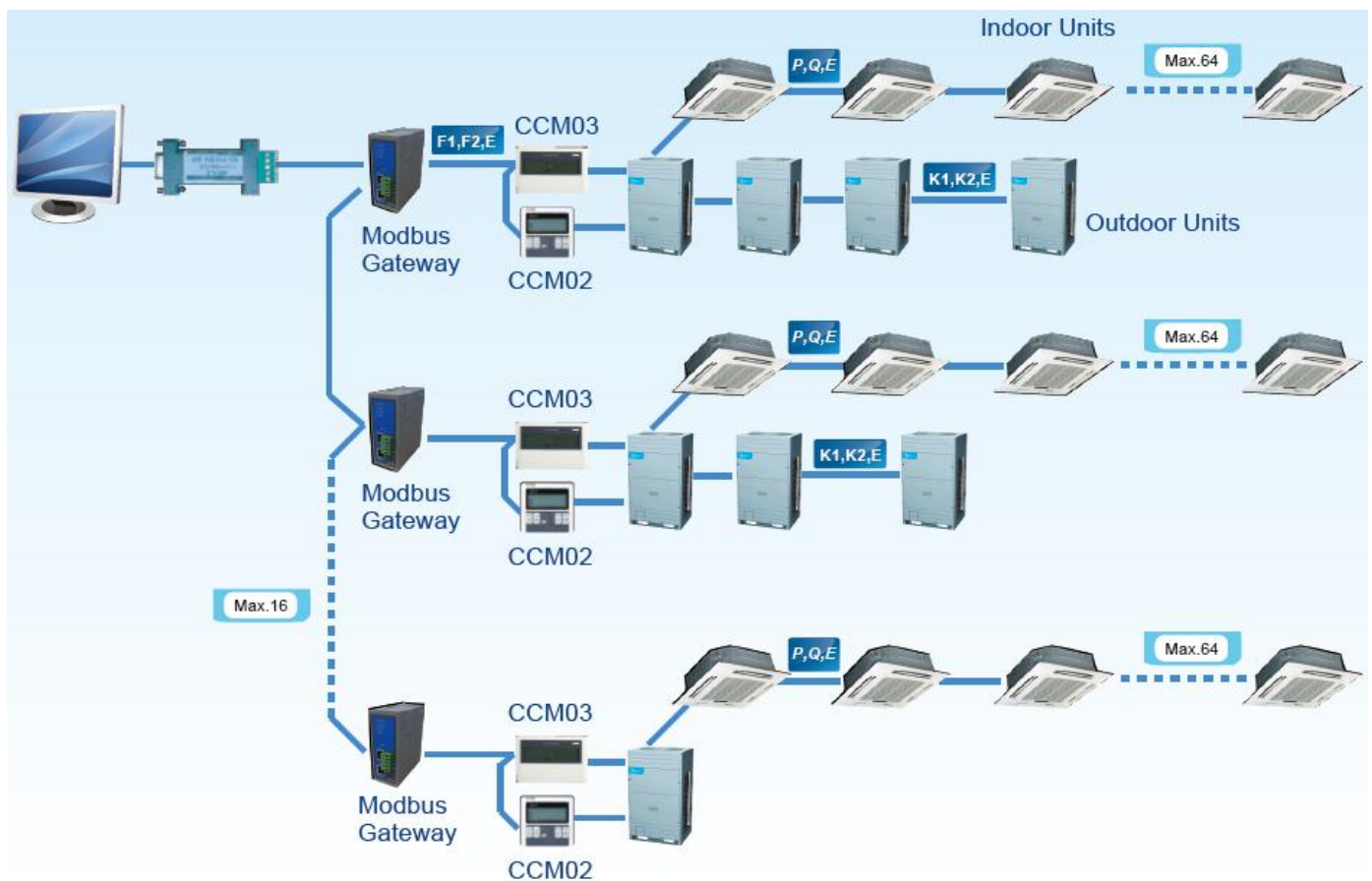
2.5.3 Modbus BMS gateway: GateWay01/E

GateWay01/E support the Modbus protocol network, bridge the Midea central AC system to the BMS, compose a Modbus network of up to 1024 indoor units and 64 outdoor units.


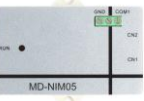



- ✧ support the Modbus protocol network
- ✧ Each GateWay01/E can connect 1 CCM02 and 1 CCM03, 64 indoor units and 4 outdoor units
- ✧ Maximum 16 GateWay01/E can be connected to one Modbus network
- ✧ One Modbus network can connect up to 1024 indoor units and 64 outdoor units.
- ✧ Transfer the information via the RTU mode
- ✧ Wide voltage 12-48V DC adaptable

Network example



2.6 Other Accessory

Assy.	Model		Description
Digital ammeter	DTS634/D T636		Send the electric energy data to outdoor unit for realizing network fee charge function.
Hotel card-inserter assy.	MD-NIM05 /E		Match hotel card system to control the air conditioning.
Infrared sensor	MD-NIM09 /E		Detects changes in infrared radiation which occur when there is movement by a person(or object).

2.6.1 Digital ammeter DTS634/DT636

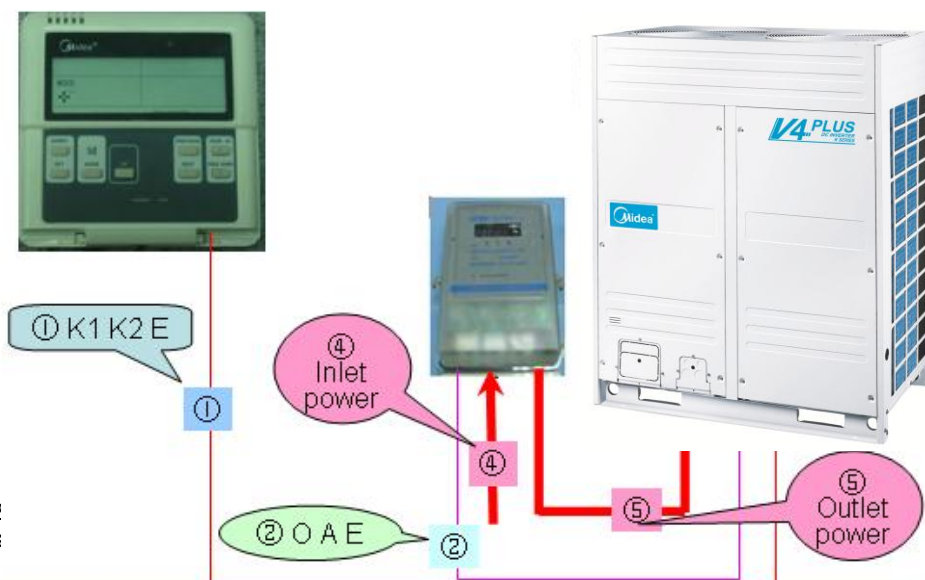
The digital ammeter DTS634/DT636 is a device to calculate the power consumption of the outdoor unit and transmit the information when it is required.



- **Steadily functioning and needs no adjusting.**
- **Be with great precision.**
- **Works in wide working temperature, from -35 °C to +55°C.**
- **Be able to be built inside the outdoor units in our factory.**

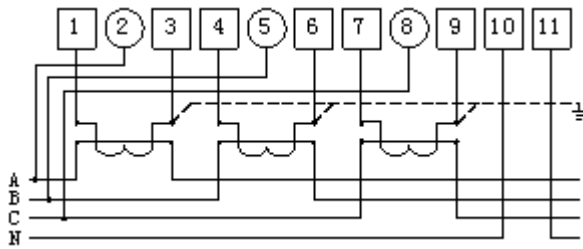
2.6.1.1 Digital ammeter wiring

The ammeter has two kinds of ports. One is the power port used to calculate the current flow through it. The other is the signal port O, A, E used to send the signals to the other device. Both of these two kinds of port should be connected and fastened before use.

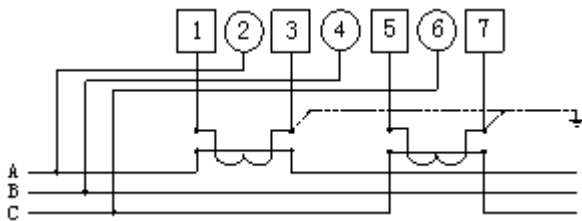


Digital ammeter power line connecting.

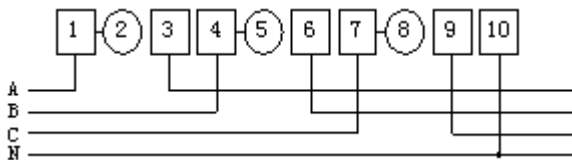
1) Three-phase four-wire system with current transformer



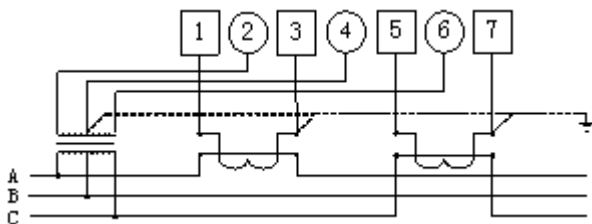
2) Three-phase three-wire system with current transformer



3) Three-phase four-wire system

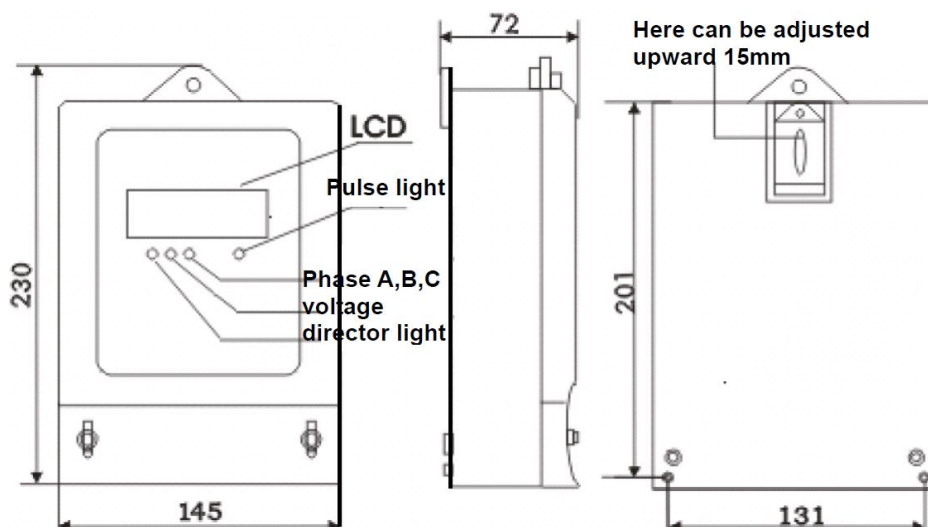


4) Three-phase three-wire system with current transformer and voltage transformer



2.6.1.2 Installation

Dimensions



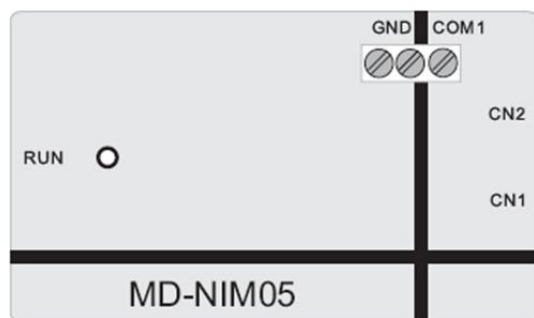
Note: The ammeter device is an optional device. Without this device, the central AC system is also able

to work normally.

If users want to realize the network fee calculating function, this device is necessary. And each outdoor unit should equip one ammeter. Do remember to fix the power line terminals and the signal line terminals before use.

2.6.2 Hotel card-insert accessories **MD-NIM05/E and MD-NIM05/E-1**

MD-NIM05/E and MD-NIM05/E-1 are mainly designed for the hotel card-insert system. It offers a smart way to save energy and manage the air conditioners.



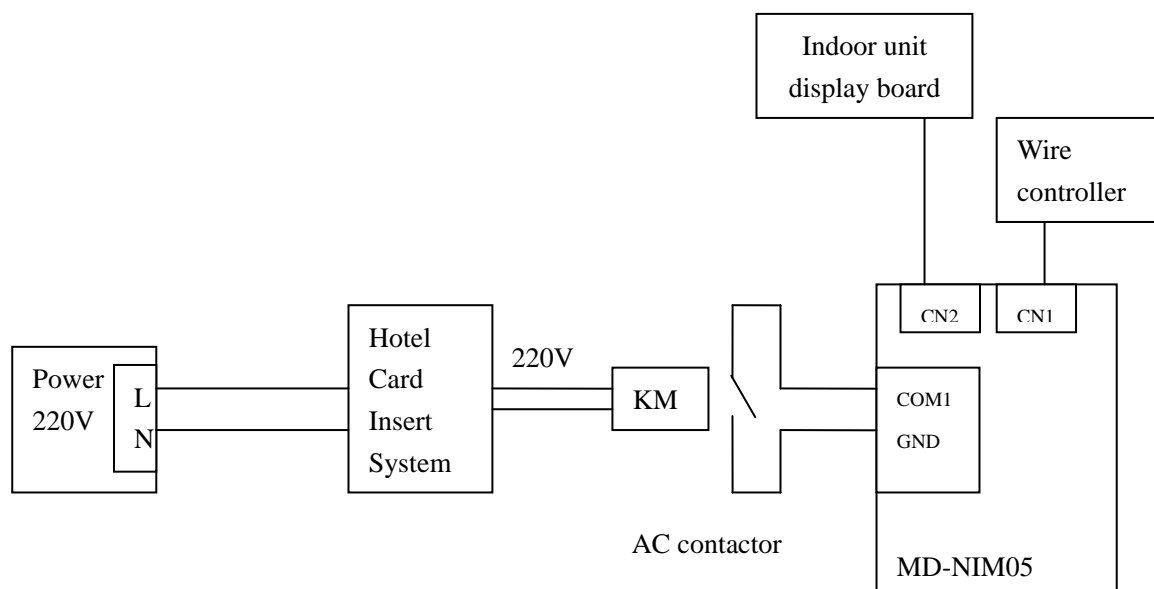
- A smart way to save energy and money.
- Cooperates with the hotel card-insert system.
- Extra power supply is unnecessary.
- Connected but insulate to the card-insert system
- Easy to install.

The main difference between MD-NIM05/E and MD-NIM05/E-1 is that MD-NIM05/E-1 is able to record the running status after power off and recover the unit to the previous running status. While MD-NIM05/E runs the unit to the default starting status after power off.

2.6.2.1 Wiring

When the card is inserted, to turn on the air conditioner, the terminal COM1 and GND should be connected or short. So the card-insert system should send the signal to the terminal COM1 and GND. The wiring diagram should be as follows.

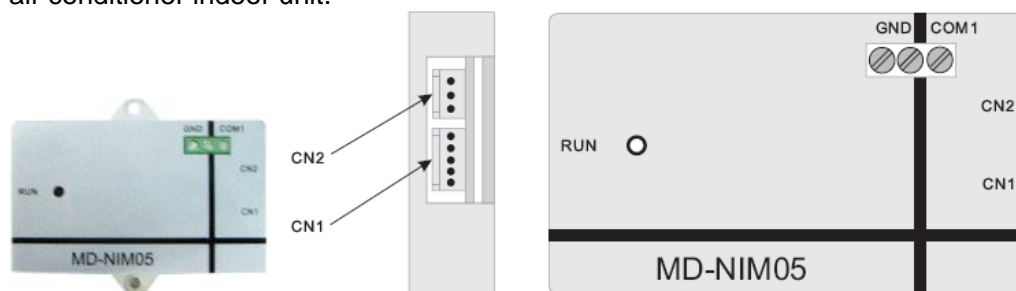
Wiring diagram:



Note:

- 1) An AC contactor or a delay is necessary to transform the signal.
- 2) Wiring assy. 1 connects the CN1 of hotel card-insert assy. to wire controller of air conditioner.
- 3) Wiring assy. 2 connects the CN2 of hotel card-insert assy. to display board and main control board of

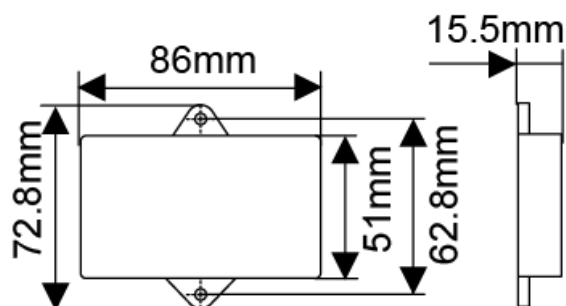
air conditioner indoor unit.



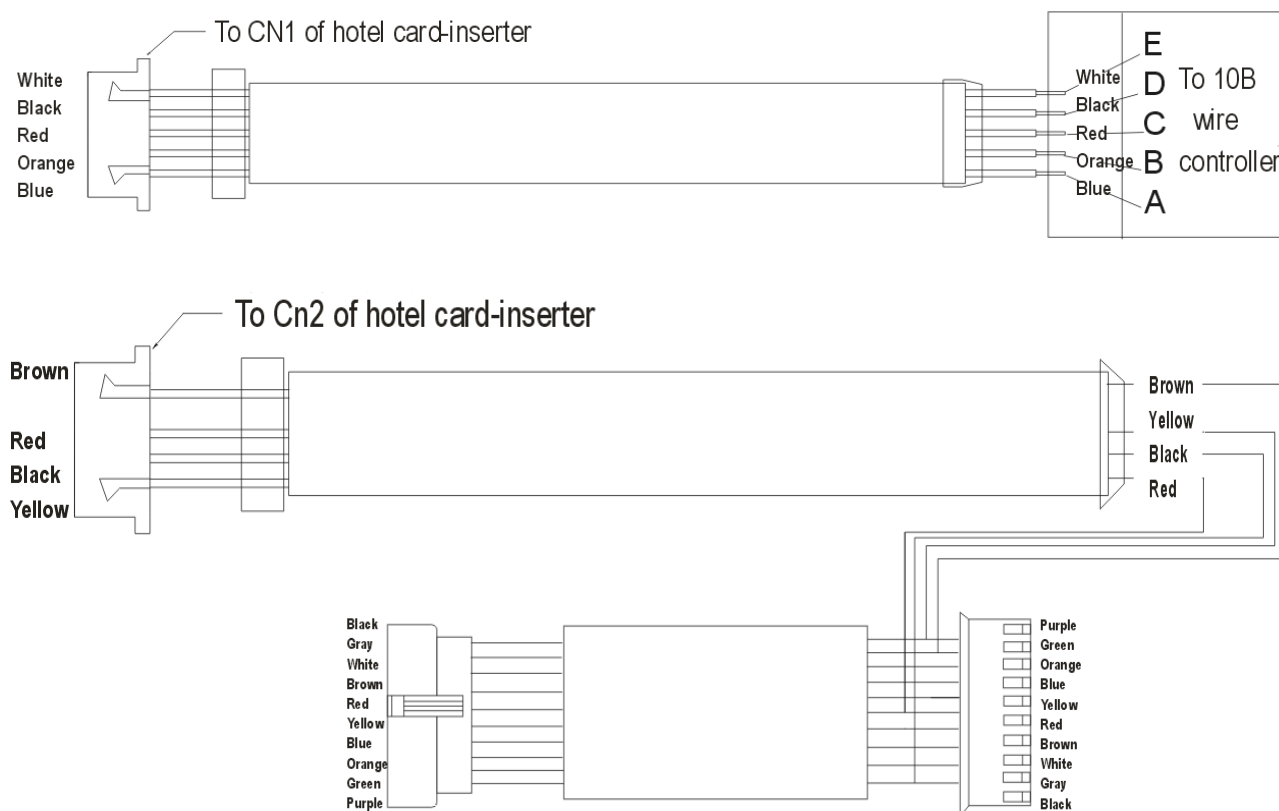
Note: COM1 and GND terminals should be short to work and not be connected to the power. The electricity voltage over 5V will probably damage the device or get the device burnt and cause fire.

2.6.2.2 Installation

Dimensions



Wires



2.6.2.3 Operation description

- 1) Connect 5-place terminal at fixed rated wire controller via 5 terminals: A, B, C, D, E.
- 2) Connect LCD at main control panel of indoor unit via terminals REV, C, D, E.
- 3) Upon wiring according to the wiring diagram in, Please power to the wire controller and switch on it.

Electric and Control System

When card has been inserted between in COM1 and GND, air conditioner is turn on and its operation mode could be set, the director lamp at wire controller is light-up.

4) When no card has been inserted between in COM1 and GND (i.e. It not be short connected), the ON/OFF button of wire controller cannot start air conditioner, but two beeps of air conditioner closed down signals be giving out and no lamp is light-up at wire controller.

5) User must apply wire controller to turn on air conditioner and set operation modes every time power is input. After then, operation modes of this performance would be memorized, although took off card and than insert it on again, as long as power does not be cut off from main unit. i.e. air conditioner will turn off when card is took off, while insert it on again unit will perform as per the last setting.

Notice: the first start-up of main unit and mode setting must apply wire controller.

6) System can receives signal delivering from fixed rated wire controller (KJR-10B), and transits the signal to indoor unit; it can also memorizes the latest ON/OFF information sending by wire controller (Timing information be transited but memorized.)

7) Upon powered to card-inserter, transited signal defaults as unit shutdown. Once take off the card, system will send signal of unit shutdown twice; till to the next time card is inserted, system will not start unit until 3 seconds later, because of memory information delivery.

2.6.3 Infrared Sensor MD-NIM09/E

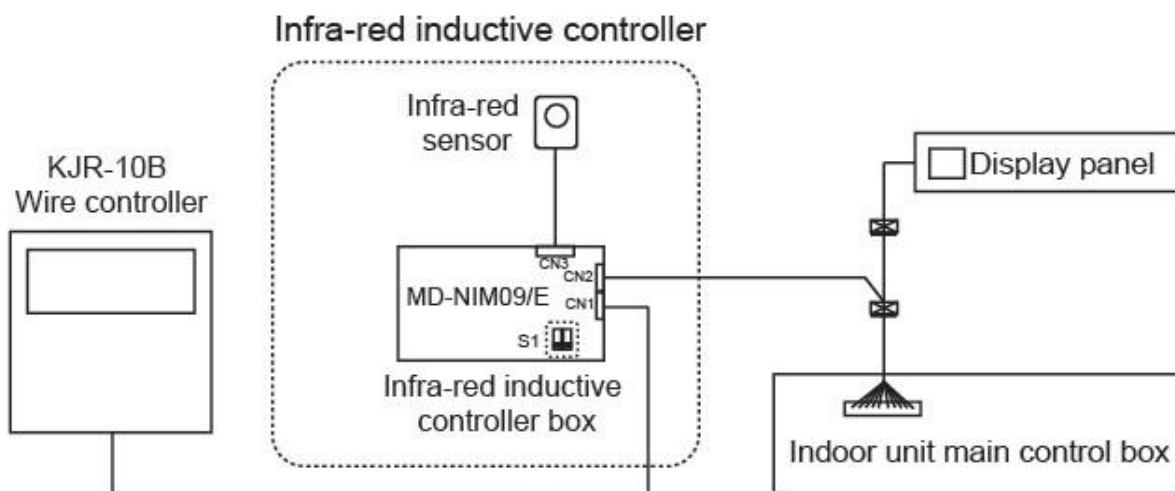
CE-MD-NIM09/E is an infrared sensor, which is able to detect whether there is people nearby and auto change the air conditioner back to running mode. This humanistic device helps making a comfortable environment for the users and the turning down the conditioner automatically.



- **Be easy to install on the wall or ceiling.**
- **Be with a wide detective angle up to 100° .**
- **Detective distance is at least 4M, great sensibility.**
- **Be powered from the indoor unit display panel. Safe and extra power supply is unnecessary.**

2.6.3.1 Wiring of MD-NIM09/E

The infrared sensor MD-NIM09/E contains a sensor and a control box. The control box helps connecting the device to the wire controller and the indoor unit.






As show above, the MD-NIM09/E has 3 connecting port.

CN1 is used for connecting the wire controller.

CN2 is used for connecting the indoor unit's display panel.

CN3 is used for connecting the infrared sensor.

The switch S1 stands for:

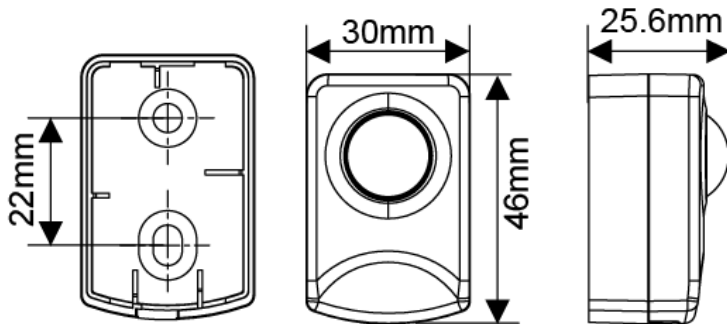
ON 	Turn off the indoor units in 1 hour after users leave.
ON 	Turn off the indoor units in 0.5 hour after users leave.
ON 	Reserved.

2.6.3.2 How to use?

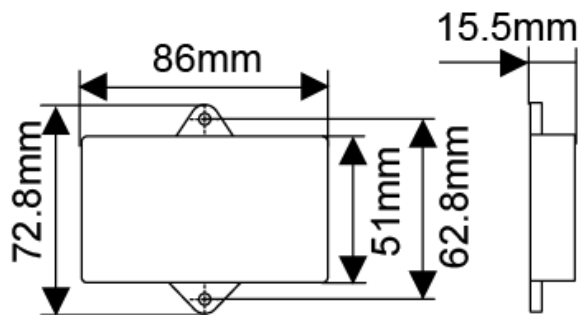
The general function of MD-NIM09/E is turning down the indoor unit automatically. So users should run the indoor unit firstly and adjust the temperature, fan speed, etc, via the wire controller. Once set, users do not need to turn down the indoor unit. The MD-NIM09 will turn it down automatically after the users leave. Once the users come to the infrared sensor's detective area, the MD-NIM09 turn the indoor unit on and runs it at the status which is set previously..

2.6.3.3 Installation

Dimensions

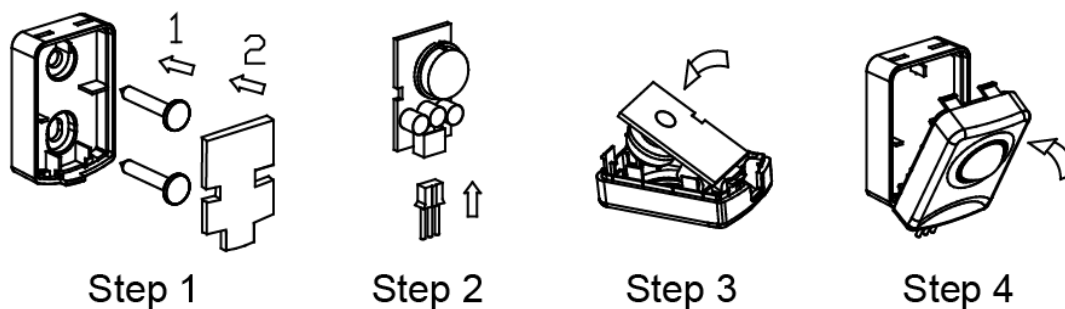


Infrared sensor

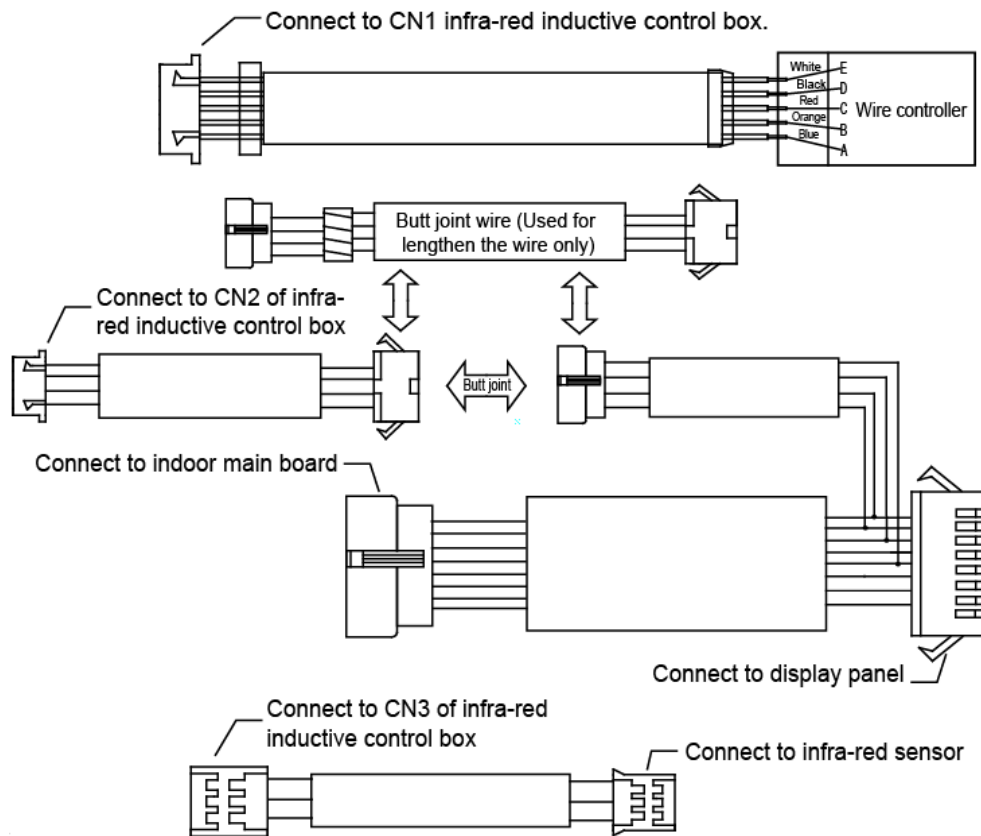


Control box

Connecting and Assembly

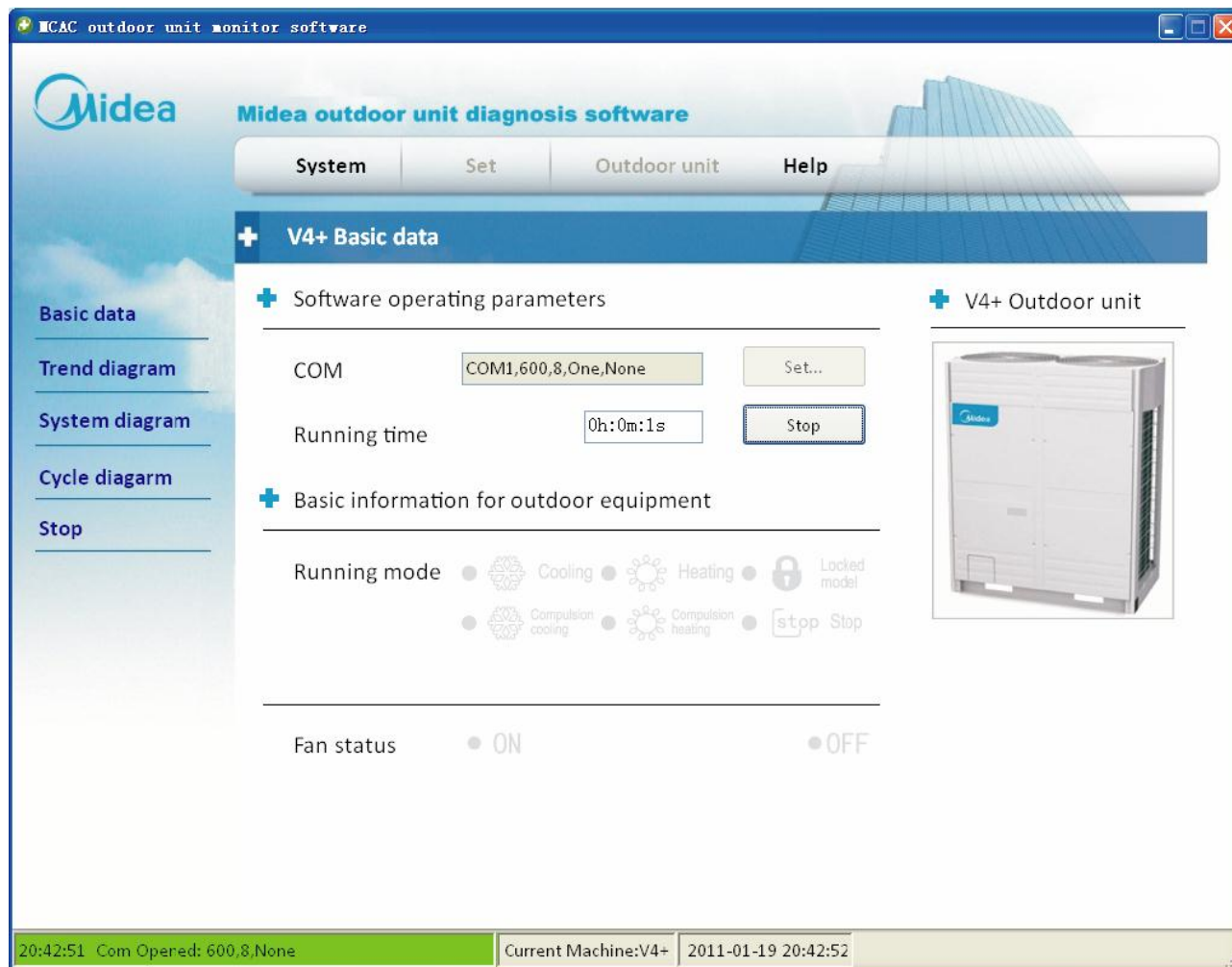


Wires



2.6.4 Computer diagnostic modules and software MCAC-DIAG/E

MCAC-DIAG/E is remote diagnostic software, which is able to inquire the outdoor unit's running status and make the running charts. This software takes advantage of the outdoor unit's K1, K2, E terminals. As a result, the centralized controller CCM02 is unable to connect to the outdoor units and unable to work with the network monitoring software.



Please refer to “installation and operation manual” of the “Midea Outdoor Unit Diagnosis Software manual”.



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Have received ISO 9001 certification for
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Certificate Registration
NO.01 100 019209



ISO 14001: 2004

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system
Standard ISO 14001 certification
Certificate NO.CC 1417

The International Division
Midea Air Conditioning and Refrigeration Sector

Add: West region of Midea commercial air conditioner department, Industry Avenue, Beijiao, Shunde, Foshan, Guangdong, P.R.China. Postal code: 528311

Tel: +86-757-26390820

Fax: +86-757-23270470

<http://www.midea.com>

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